The Builder.

VOL. XXI.—No. 1047.

The Royal Mausoleum at Frogmore.

WE are graciously enabled to present to our readers the plan and elevation of a building of which only fragmentary and unauthorized notices have hitherto appeared; but it is one in which all who revere the memory of the lamented Prince Consort must feel a deep and painful interest.

Early in January last year, Professor L. Gruner and Mr. A. J. Humbert were honoured with the Queen's commands to prepare designs for a Royal Mausoleum to be erected at Frogmore. One condition was especially imposed by Her Majesty; viz., that the central portion of the structure should be roofed in and substantially completed in the course of the year. Towards the end of January designs were submitted and approved. On the 15th of March the foundation-stone was laid by the Queen; and the dome over the central octagon was turned about the middle of October. The building was consecrated by the Bishop of Oxford in the presence of Her Majesty and all the members of the Royal Family on the 17th of December; and on the following day the mortal remains of his Royal Highness the Prince Consort were removed from Windsor, and placed in a temporary stone sarcophagus in the new edifice.

The mausoleum, as will be readily gathered from the accompanying plan and perspective view,* is in the form of a cross; the arms (or limbs) of which are of equal length; with the addition of a porch on the eastern side.

Externally, the breadth is 70 feet, and the length 80 feet. The extreme height from the general level of the ground to the top of the cross is 83 feet; and the height from the floor of the structure to the top of the central roof, exclusive of the cross, is 70 feet. Internally, there is a central octagonal chamber, 30 feet in diameter, and 65 feet high, roofed with an octagonal dome: each arm of the cross is 16 feet square.

There are connecting corridors or passages at the back of the four main supports of the dome; giving access to each of the arms of the cross, independently of the central portion of the structure.

The floor of the building is raised considerably above the ground; and beneath is a vaulted crypt or chamber, to which access is gained by descending a narrow winding staircase in the thickness of the wall, near the entrance doorway. This crypt was constructed for the purpose of insuring the dryness of the superstructure, by obtaining a free current of air beneath it.

The exterior of the building to the height of about 10 or 11 feet is faced entirely with granite, and above this with Portland stone and granite. The walls are of unusual thickness, and constructed in the most solid manner, a large proportion of the stones weighing from one ton to one ton and a half, and some as much as from three to four tons. All the external columns are of polished granite.

The interior of the building will be faced with coloured marbles and serpentines, combined with frescoes and other decorations. Keeping in mind the deep and incessant interest taken by the Prince in the development of the material productions of this and other countries, there was an anxious desire on the part of those who had been intrusted with the construction of his tomb to avail themselves to the utmost of all such materials suited to the purpose as could be readily procured, more particularly from the British dominions. Thus the woodwork is of Indian teak, the roofs of Australian copper: Wales and Ireland contribute a variety of marbles: Scotland and the Channel Islands supply granite; whilst England is represented by her Portland stone, her granite from Devon and Cornwall, and her Cornish serpentine. Belgium, France, Italy, Greece, and Portugal,* also furnish marbles to enrich the interior of the edifice.

It is intended that a large sarcophagus, of dark grey Aberdeen granite, should occupy the centre of the structure under the dome. The sarcophagus will rest upon a step of polished black marble, with kneeling angels in bronze, at the four angles; and upon it will be placed a recumbent statue of the Prince Consort, in white marble. This work is now being executed by Baron Marochetti, who has been honoured with her Majesty's commands to prepare and carry into execution the design. In this double sarcophagus it is intended that ultimately the Queen's remains shall likewise be deposited by the side of her beloved and deeply lamented Consort; and a recumbent statue to correspond with that of the Prince will be placed next to his. Long may this be wanting!

On the upper part of the bronze door-frame, in the porch, will be the following inscription:—

ALBERTI PRINCIPIS QVOD MORTALE ERAT
HOC IN SEPVLCRO DEPONI VOLVIT
VIDVA MŒRENS VICTORIA REGINA
VALE DESIDERATISSIME! HIC DEMVM
CONQVIESCAM TECVM
TECVM IN CHRISTO CONSVRGAM.

The central portion of the structure is the only part at present roofed in: temporary brick walls have been erected under each of the four large arches supporting the octagon and dome above; forming a chamber complete in itself, 30 feet in diameter, and 65 feet high, in which the stone sarcophagus is placed.

The external walls, owing to delays arising from the difficulty experienced in obtaining the marble and granite, are yet far from being complete.

Mr. George Dines, successor to the late Mr. Thomas Cubitt, of Pimlico, is the builder; and Mr. William Thomas, the clerk of the works.

* See pp. 152, 153.

* The Portuguese marble, "Emperor's Red," of unusually fine quality, was a present from the lamented king, Don Pedro, of Portugal.

† See p. 131, *ante*.

NOTES ON THE PROPERTIES OF WOOD.†

TREES cut in summer give lighter wood than when felled during winter time. The cause for this may probably be ascribed to the fact that in winter a large amount of nourishment is stored in the stem which, during the spring and summer, is spent for the formation of bloom and leaves.

We call hardness of the wood resistance which it opposes when another body enters it. If wood were an equal body like minerals, we should be able to determine its resisting power or hardness; but it being differently built, and, whilst trying its hardness, other properties interfering, we cannot arrive at a decisive result.

Sometimes a wood has very hard fibres but very little body; that is, it is lighter built than another wood with soft fibres and a full body: it is therefore unadvisable to judge the hardness of a wood according to its fibres. Experiments to ascertain its hardness should be made across the stem and not upon a longitudinal section; and although there is no instrument which leads us at once to a definite result, we can generally arrive with a saw at a fair conclusion. Many persons constantly employed on wood are of the opinion that it becomes harder if it is worked or barked whilst green.

Wood, as a porous body, contains in its natural state—whether dead or alive—a certain amount of moisture: by the loss of that moisture or increase of the same the bulk of the wood either contracts or expands.

If we have a piece of wood when this action takes place only upon one side, it is obvious that the piece will alter its form or shape.

The consequence of the loss of moisture is also the warping and splitting of the wood. The inner structure of a stem is irregular: for instance, we find the inner moisture of a yearly ring to be more than on its outer side: this causes the splits on the exterior, after the wood is dry; and it also accounts for the impossibility to form out of green wood a regular body which could not lose its weight or shape. The time during which the evaporation of the moisture takes place depends upon the state of the atmosphere. Several authors are of opinion that the contraction is regulated by the specific weight. This, as a rule, cannot be adopted: for instance, lilac and oak both being heavy and hard, contract quickly, whilst the double American maple, which is equally hard, contracts slowly. It is evident, however, that the fuller of sap a tree is the greater will be the contraction. This will account for the fact, that we find on cut timber the cracks extend from the exterior towards the centre, because the sapwood will contract more than the heart-wood.

Planks turn with their sides upwards; that is, the edges rise from the level of the centre line. This explains why we turn the inside of a plank towards the joists whilst we lay a floor, which prevents the twisting. The contraction and action of the wood cannot be checked altogether. Among the means to prevent it stands foremost the one of putting the tree into water; but when taken out it must not be stored in a place where it dries too soon, as it still would burst if done; nor must it be left too long in the water, as this will injure the quality of the wood.

All the wood which is used is never quite dry: besides this, it works a little in itself under the changes of the atmosphere; and therefore attention must be paid to the selection of the timber for the same purpose, for the heart-wood is less subject to such action than sap or splint wood. This is an important point with the furniture makers. The expansion or contraction is less apparent in the length of the fibre than in the cross section of the wood.

The elasticity of the wood is called its property of return to its original form and shape after such have been altered by another cause. With this quality is connected the valuable fitness of some woods to transmit sounds, for which reason they are much used by instrument makers. The elasticity has its limit; and the more a piece of wood can be bent without breaking the greater its elasticity.

The resistance of wood depends upon the three following conditions:—1st. Two pieces of equal length and height offer different resistance with reference to their breadth. 2nd. Two pieces of equal length and breadth offer different resistance with regard to their height. 3rd. Two pieces of wood of equal height and breadth offer different resistance with regard to their length.

Again, experience has proved that a piece of wood resting freely with its two ends will carry from one-third to one-half less weight than if the ends are fixed or built in a wall. Old wood has less elasticity than young, and heart-wood is less elastic than sap-wood. The same difference is found with wood from the lower stem compared with that from the upper crown. The elasticity diminishes with the progress of the specific dry weight. Square-cut timbers laid horizontally with their yearly rings have not by far such bearing power as when laid perpendicularly.

Green wood has considerable elasticity. Young stems, although they suffer sometimes by the wind, will regain their original position in a short time. Here it is necessary to mention that where young stems or branches have been bent through snow for a longer period, they will not return to their former form.

I submit to you the following as the result of some experiments relative to the bearing capacity of various woods. The pieces were all 3 feet long

and 2 inches by 1 inch, and air-dry. The constants arrived at were the following:—

	Constant.	Wet.	Weight. per C. Ft.
Yellow Pine	358·5		25·687 lb.
Baltic Pine	444·		29·062 ,,
Red Pine	467·		33·437 ,,
Ash	517·75	53·875	41·812 ,,
English Elm	595·25		37·312 ,,
Pitch Pine	629·		45·750 ,,
American Elm	631·5		45·312 ,,
American Oak	653·5		44·875 ,,
African Teak	673·5		65·562 ,,
Mora	691·		71·250 ,,
Sabicu	854·25		59·687 ,,
African Oak	869·5		
Green heart	1,079·5		69·750 ,,
English Oak	—		53·312 ,,
Indian Teak	—		38·125 ,,
Iron Wood	—		73·500 ,,
English Larch	—		32·562 ,,

Formula to find the breaking-weight of a piece of timber: — c constant, b breadth in inches, d depth in inches, l length in feet, w breaking-weight in pounds.

$$\frac{c \quad b \quad d^2}{l} = w.$$

The adaptability of green heart for hydraulic construction, dock-gates, &c., cannot be over-estimated. I refer you to an instance where a clough was taken out of a sewer after sixteen years: it had been made half of oak and the other half of green heart: the oak was completely worm-eaten, whilst the green heart was in its original condition. This certainly contrasts with the fact mentioned by Mr. Burnell in his paper, that he has a piece of green-heart riddled by the teredo; and it would be interesting to ascertain under what circumstances the teredo will attack or not attack this kind of wood. My experience proves that green-heart is exempt from the therosion by the teredo; but there is a mollusc in this timber which we find alive in it as the same arrives here from the West Indies. The worm is found in sizes from the lymexylon to the teredo; but is of a different species, and seems not to live in this wood when used in such constructions as dock-gates, &c., in this country. Green sapwood will not retain its form and bend if it is suspended horizontally by its two ends.

The same will occur in timber constructions where green wood has been used. I may mention that the artificial process of drying wood should not be extended beyond 10 per cent., because it will cause it to become brittle and totally useless. A close examination of a beam supported by its two ends will tell that the upper half of the fibres are stowing while the lower fibres are extending. The centre of gravity lies in the middle of the cross section. All woods do not offer the same resistance, and we can increase it by strengthening the centre of gravity. M. Duhamel describes in his work, "De la Force des Bois," the following experiment in elucidation of this fact: he took twenty-four sticks cut from young willows of equal strength: each stick was 3 feet (Paris) long, and 1½ inch square. Six of these broke in the centre, with an average weight of 256·909 kilogrammes (1 kilogramme equals 2·205 lb. English). In two other pieces he made a cut across ¼ inch deep in the centre, and filled it out with a piece of oak: they broke with an average weight of 269·718 kilogrammes. Two more were cut ½ inch deep, and otherwise treated in the same manner: they broke with 265·312 kilogrammes. Five were cut ¾ inch, and broke with 259·764 kilogrammes. From this it results that the smaller piece of harder wood, fixed across the centre, considerably increased the strength of the stems when put in half and even three-quarters of the thickness. It is also the reason why a beam composed of several smaller pieces will bear as much as if of one entire piece. And again, as the bearing power of the timber varies, some advantageous results may be obtained by putting stronger and weaker wood together in a construction.

A round or square piece of a stem will offer about the same resistance from each side; but if we compare a timber cut with the yearly rings vertically with another having the rings horizontally, we find that the former will bear more than the latter.

The sap which protects the wood does not prevent its decay. Turpentine, which is often in the sap, prolongs the preservation of the fibre. According to Baron Liebig, the decay of wood takes place in the three following modes: first, oxygen in the atmosphere combines with the hydrogen of the fibre, and the oxygen unites with the portion of carbon of the fibre, and evaporates as carbonic acid. This process is called decomposition. Secondly, we have to notice the actual decay of wood which takes place when it is brought in contact with rotting substances; and the third process is called putrefaction. This is stated by Liebig to arise from the inner decomposition of the wood in itself: it loses its carbon, forms carbonic acid gas, and the fibre, under the influence of the latter, is changed into white dust.

As an example of this, I refer you to the wooden ceilings of houses which after some time go into that state. The chief cause is, that the free access of the air to the wood is prevented, and the little dampness occasioned by washing is sufficient to promote the dry rot.

The sap of wood contains partly saccharine matter, which will naturally decompose in itself, and this is noticed in timber stores from the sour taste and smell of such woods.

The actual time which wood lasts depends in a great measure on the time when it was felled, and in how far the soil in which it grew was suitable for its development.

As a rule, the wood cut in summer is less durable than that felled during the winter months.

It will also be the case with trees which remain a longer period before their removal in the forest after being cut; however, a great difference does not exist between ripe woods, whether they are felled in the summer or winter time, because the formation of the leaves and the blossoms affects only the sap wood and the bark of the tree; therefore, if the sap wood is cut off and the heartwood is properly treated and seasoned, the quality of the summer wood would be equal to that cut in winter time. In support of this I mention, that most of the trees in Southern Italy are felled in July and August.

The pines in the German forests are cut down mostly in summer time, and their wood is generally very sound. The notion that this causes dry-rot must remain out of the question, for I believe whenever such takes place it is in consequence of unseasoned timber being used. Considering the large quantity of timber imported into this country, I must mention that my experience tends to show that the North American woods, with the exception of red pine, are less durable than those from the north of Europe. The latter are stronger, superior, and not so much subjected to dry-rot as the former.

In the earlier portion of this paper I had occasion to mention some enemies of the wood which attack it whilst growing: it is lucky that they are combated and destroyed to a great extent by other animals in the forest; and, among those doing great service in this respect let us remember the woodpeckers, finches, swine, hedgehogs, badgers, frogs, and many others.

Dry or dead wood has also some terrible foes, which at times cause alarming ravages; and unfortunately no effectual means have as yet been found to check them: the most dangerous of them are the termites, the lymexylon, the sirex gigas, the teredo, and the lymnoria terebrans.

It is sometimes difficult to distinguish good from bad timber, and I beg to draw your notice to some illustrations from a work published by the French Government,—"Instructions sur les Bois de Marine," with special reference to the oaks, and to which the following explanation may serve:—

Plate 43, figure 1, represents meagre or better known as English oak, of the best quality. To this kind of oak belong the *Quercus pedunculata*, and the *Quercus sessiliflora*. The fresh cut of such is a yellow straw colour, sometimes of a rose colour. The annual rings show a fine glossy grain, which allows it to take a fine polish. The horny layer of three to five millimetres is quite distinct from the cellular portion, and the pores are very little to be seen.

This kind of oak is very sensible to the influence of the atmosphere. In damp weather it swells, and in a dry temperature it contracts considerably. This makes it liable to split; but notwithstanding this it is excellent wood, and the best suited for the ribs in a ship. The fibres hold together with a great longitudinal and even transversal tenacity, which gives it a great resisting power.

Plate 43, figure 3, shows the cross section of an inferior quality. It is spongy; has large pores of a pale colour, sometimes brown or reddish; its deficiency has been caused by too wet a soil, by want of nourishment, or of fresh air, or of any other condition requisite for its full development.

If such wood be ruptured it will break clean off, and a fibre may be rubbed into dust between two fingers. A valuable property of this kind of oak is, that it alters very little by the changes in the atmosphere, and it is therefore much in use for floors, furniture, and carpentry.

Between these two qualities of oak, range a great number of others, differing in their condition.

When trees are found to be vicious at the trunk, it must be attributed to an interruption of the functions of the roots. It will occur that one or several of the roots die, by which putrefaction is imparted into the lower part of the stem. If this rot be white or black, it is not very dangerous: it does not generally reach more than 1 foot above the roots; but when this rot is of red colour, the wood should not be used in construction, or it will soon lead to decay.

Trees arrive at an age when their wood becomes ripe, and then it is time to fell them. It may be seen when the top of the tree brings forth no leaves in spring. Such trees are superannuated; that is to say, they grow no longer; and then they become subjected to a serious evil called the dial. This is explained by the following process:—We know that with a vigorous tree in full growth the heartwood contains the smallest portion of water, and that its density decreases from the centre towards the circumference: when it is felled and dried it will split from the outer side towards the centre. This is not the case with a superannuated tree, in which the oldest wood begins to perish first; and consequently the greatest density lies between the heartwood and the bark. Now, in such a tree the central wood contracts while drying, which causes the splits. Sometimes splits are found in trees which bear a glossy blackish aspect, and they must be distinguished from those just mentioned. They extend from the circumference towards the heart, and were created whilst the tree was growing. It is asserted that they are effected by frost. They look at first straight or capillary, and enlarge with each heavy cold. They show themselves mostly longitudinally, on a swelling of the stem, and make the tree useless.

The splits in the heart of a tree must not be confounded with holes caused in falling. There is no danger with the latter beyond that they diminish the length of the timber.

Often in the trunk of a stem a particular irregularity is found in the non-juxtaposition of two successive annual rings.

This fault is caused by strong winds, which affect it in the point where the flexion of the stem has its maximum.

It will also arise when the tree has not sufficient nourishment, by which two layers are prevented from growing well together. It shows itself in incomplete dark rings. If these are only in the sapwood they may be looked upon as unimportant; but when they are, on the contrary, in the heartwood, and accompanied with the dial, they betray a serious vice in the tree.

In different cross sections of an oak we often notice circular bands of a different colour from the remainder of the section, sometimes white, yellow, red, or brown. The texture of these bands appears loose, even spongy, and betrays signs of decomposition. It is found in the best qualities of wood, and it cannot be cured. The reason for this decay is not definitely known. Some persons suppose it to arise when the sapwood is prevented by severe cold from developing itself into good wood. When this evil is in the heart, it looks like a whitish circle, and is called the moon. Wood from such trees ought not to be used, because it will soon decay. When the vicious bands are straight, and the shades of colour are less observed, the vice is not so dangerous.

Druxy knots are caused by woodpeckers, by lopping, and by dead and broken branches, which make holes into the tree: into these the water runs, decomposes, and directs the evil towards the inner stem. If we find on a tree a swelling or depression, we may conclude that the condition of the tree is bad. Such trees are often found with the sap running out of their armpits. Among the various rots engendered by the knots we have the following:—

Wet rots are composed of porous fibre running from the knot into the trunk of a tree. This rot is of brown colour, and has an offensive smell.

This evil is often found with white spots, the latter of watery substance. When it has yellow flames it is very dangerous. Black coloured knots are easily cured, and unimportant.

We find wounds on trees which have been effected by the fall of a neighbouring tree or by the friction of a cartwheel through which the rind was torn. If this wound does not reach beyond the bark, it has no bad effect upon the wood; but should it have damaged the ligneous portion of the stem, the wood takes soon a green-like colour, and begins to decompose.

It occurs that a new rind grows over such wounds, and in such instances the evil is not detected until the stem is cut into timber. Similar defects are also caused by lightning.

As a very elaborate work upon the various kinds

of oak, I mention Kotschy's, Eichen Europa's, *Durability and Preservation of Wood.*

Well-seasoned timber will last for an indefinite period if kept in dry air or under water; but when alternately exposed to atmosphere, water, and light, it begins to decompose. The ordinary causes by which this is effected are chiefly the fermentation of the azotic substances contained in the cellular tissue. This is developed under the influence of the oxygen in the atmosphere, and by the moisture contained in the wood. We have therefore the problem to find means to prevent this fermentation, either by obviating all such circumstances as air and water, or to extract from the wood its vegetal albumen, or to act upon the latter in a manner that it resists fermentation, and also the attack of insects. No process has as yet been invented which answers to all these conditions, and with all trials we must have the assistance of chemistry and entomology.

I refer to our museums as the place where, among other rude-made articles, here and there is left a remnant of wood which bears the ages of decenniums, and other specimens of petrified wood which must have been in existence in its natural state centuries ago.

That wood in sandy soil will last for centuries may be seen in the specimens which were dug up whilst making the new docks at Birkenhead, from depths varying from 8 feet to 32 feet below the surface, and they are reckoned to have been there for centuries.

Among the many inventions to preserve wood, those of England have proved the most successful. Already in 1737 a patent was granted to Mr. Emerson, to prepare timber with hot oil, and soon after the methods of Oxford and Kyan came into use.

In 1837 a patent was taken out by Margary, to impregnate wood with sulphate of copper; and since 1838, Sir William Burnett's system, chloride of zinc, was also used.

Mr. Payne obtained a patent in 1841 for preparing wood with two solutions, such as carbonate of soda and sulphate of iron. Some very good results are obtained with this system, but it must be done with the greatest care.

Still better is the invention patented by Mr. J. Bethell, which consists in the injection of oil of tar after the air has been extracted. This process is effective to a great extent, and for a full description I refer you to Mr. Brunell's paper, read before the Society of Arts, in London, 1860.

The disadvantage with the creosoting system is the offensive smell and the increased danger by fire; but it is recommendable for railways and hydraulic works.

In France the price of creosote is too high to admit its general use; and solutions of metallic salts are used instead. Among these M. Boucherie's method has obtained the best results. He acts with a pressure of 5 or 7 feet of water upon wood not later than two or three months after it is felled, and injects a solution of sulphate of copper by a transversal section, while the sap runs out in the opposite direction. Railway sleepers prepared in this manner were laid down in 1846; and in 1853 they were in such good condition that ever since M. Boucherie's system is much applied in France. Another economical process of Mr. Fontenay is worth mentioning. He acts upon wood with what he calls metallic soap, which he obtains from the residues in greasing-boxes of carriages; also from the acid remains of oil, suet, iron and brass dust, which are all melted together.

A piece of wood was put in such a hot fluid for forty-eight hours after the water had previously been partly extracted under the ordinary pressure of the atmosphere. When taken out the metallic solution which it had taken up stood at 3 per cent. to its first weight. This piece of wood was used as a railway sleeper on the Orleans Railroad, and after eight months it was in perfect condition, whilst other wood not treated in similar manner was in a state of decomposition.

Another process is the following, recommended by Mr. Dondeine, and much applied in France and Germany. It is a paint, consisting of the following:—

Linseed oil	15	kilogrammes.
Resin	15	,,
Tar	5	,,
Zinc or white lead	12	,,
Vermillion, red or yellow	10	,,
Colour (clay colours must be avoided as they thicken too much)	4	,,
Cement	6	,,
Oxide of iron	8	,,
Gutta percha, glue, or gum	2	,,
Hydrate of chalk	6	,,
Lard	15	,,
Litharge	2	,,

(One kilogramme = 2,205lb. English).

All these are well mixed, and reduced by boiling to one-tenth. When applied warm it may be used with a brush; but not too hot. It may also be used cold; in which case the paste must be mixed with a little varnish or turpentine oil. The results obtained with this process are reported as yet very satisfactory. It prevents decay, and admits no humidity.

Mr. Dondeine further reports that it prevents oxydation of iron; and wherever walls have had a coat of this mixture it has kept away all wet, and unpleasant insects, ants, bugs, &c. Roofs of pasteboard or of wood which have been painted with the mixture keep dry, and withstand the effects of rain and snow.

Wood impregnated with sulphate of copper will not last longer in sea-water than other wood. It is quite as much attacked by the sea worm as when in its natural state. On the other hand it has been proved that wood impregnated with sulphate of copper will have longer durability in the soil than when either tarred or charred.

The following statement of M. Brouzet to the French Academy may also be of interest. He has a seat in the Carennes Mountain, where he cultivates silk-worms. The shelves upon which they breed are of pine. During the period from 1853 to 1858 all his crops perished through illness. In 1860 he was induced to make new shelves of pine impregnated with sulphate of copper, and ever since the silk-worms have been in the finest and healthiest condition. (See "Comptes rendus de l'Academie Française," vol. 54).

At Saint Sebastian, in Spain, the piles of a wooden bridge standing in the sea have been guarded against the attacks of sea-worms in the following manner. Each pile is surrounded by a wooden box, and the space between filled up with cement. After six years it was proved that the piles were in perfect condition, whilst the outer boxes were completely riddled by the worms.

With these I conclude the remarks on wood, and will next consider some works which have been constructed in that material.

JOS. JUSTEN.

"MATHEMATICS FOR PRACTICAL MEN."

THE work which forms the basis of the one before us,* was first published by Dr. Gregory in 1825, and passed into a second edition. In the year 1847 the third edition was published under the direction of Mr. Law; but the mathematical sciences having greatly advanced during the twenty-two years which had intervened since the first edition appeared, it was found necessary not only to enlarge but also to re-write a large portion of the book. A section on the use of logarithms, with copious tables, was added to the chapter on Arithmetic. Much new matter was also added in that on Algebra; and the chapters on geometry, mensuration, trigonometry, and conic sections, were almost entirely rewritten. The sections on the steam-engine and the strength of materials received large additions, these subjects having had but little attention from mathematicians when the first edition appeared. The present work is in reality a second edition of that issued by Mr. Law, with but little alteration beyond the correction of typographical errors.

The object of the author was not to teach mathematics to those who were desirous of becoming mathematicians, or to supersede the usual text-books in which the various branches of the science are accurately demonstrated; but to impart a knowledge of the principles of physics, and their practical application, to those whose acquaintance with mathematics is very limited, and who have not the opportunity of taking up the study, but whose avocations nevertheless require that they shall be able to apply mathematical formulæ, or to work out the many geometrical problems which occur in the arts of common life. This work is more especially intended for the use of the engineer or architect, who here finds ready to his hand rules for solving nearly every mathematical difficulty that may arise in his practice. As a moderate acquaintance with arithmetic, algebra, and elementary geometry is absolutely necessary to the proper understanding of the most useful portions of this book, the author very wisely has devoted the first three chapters to those subjects, so that the most ignorant may be enabled to master the whole of the book without aid from any other. The rules given are in all cases explained by means of examples, in which every step of the process is clearly worked out.

In the chapter on practical geometry, we find rules for setting out curves, polygons, &c. For instance, the radius of the circumscribed circle of any regular polygon of from 3 to 12 sides, being given, its area and length of side are found by multiplying the given radius by the number found in the table against that particular form of polygon. Thus, if the radius of the circle is 10, then $10 \times \cdot765367 = 7\cdot65367$ is the side of the inscribed *octagon*. For the *decagon* the multiplier is ·618034, and for the *dodecagon* it is ·517638.

Under the head of mensuration we find rules for measuring the *area* and *periphery* of the conic sections, and also the contents of various forms of solids. The rule given for the area of an ellipse is, multiply the transverse by the conjugate diameter and again by ·785398. The periphery or circumference is found nearly by multiplying the *sum* of these diameters by 1·57079.

The chapter on trigonometry would have been much simplified if the editor had adopted the now almost universal method of treating *sines, cosines*, &c., as *ratios* instead of *lines*. One of the simplest applications of trigonometry is to the finding the height of any building without actual measurement. Let BC be the height, A the position of the observer, who measures the angle BAC by a theodolite; then $BC = AB \times \tan. BAC$; or log. BC = log. AB + log. tan. BAC; log. tan. BAC being found in the tables. The only linear measurement required in this case is the horizontal distance AB. Other rules are given for solving more complicated questions of heights of inaccessible buildings and those on the top of hills, such as will often occur in the practice of the civil or military engineer; also for approximate measurements of heights by the length of the shadow cast, by reflection in water, by the barometer, and by the velocity of sound.

In all mathematical works the *conic sections* have always had a prominent place. They are the curves formed when a plane is made to cut across a cone, either on the slant completely through the cone, the outline of section being in that case an *ellipse*; or parallel to one side of the cone when the curve is the *parabola*; or parallel to the axis of the cone when we get the *hyperbola*. Their peculiarities and the methods of drawing them are here given, and also those of other curves invented by the Greeks; as, for example, the *conchoid*, which has been suggested as the best outline for the entasis of columns. The *catenary* is the curve produced when a cord or chain is loosely suspended from two points, and is of importance in the theory of suspension-bridges.

The second and by far the larger and more important part of the volume is devoted to the examination of the various subjects known by the name of mixed mathematics, which is the application to physics of algebra and geometry. After giving a concise account of the mode of applying mathematics in the science called mechanics, we have the general application to the equilibrium of structures, as in the case of walls or piers sustaining a thrust. For example, let a wall be 39·4 feet high, of material weighing 125 lb. per cubic foot, to sustain a horizontal strain of 9,900 lb. on each foot in length applied at its summit: what must be its thickness at the base to prevent its being overthrown? The formula in this case is,—

$$\text{breadth} = \sqrt{\frac{2 \times 9900}{125}} = 12\cdot58 \text{ feet.}$$

The formulæ for the pressure of earth against walls are more complicated, but are such that a moderate knowledge of algebraical rules will suffice for their application. We also find a useful table for the thickness of walls with vertical faces supporting the pressure of different kinds of earth:—

Nature of Earth.	Thickness of wall, its height being 1.		
	Wall of brick 109 lb. per cub. ft.	Wall of unhewn stone, 135 lb. per cubic foot.	Wall of hewn freestone.
Vegetable earth, carefully laid course by course	·16	·15	·13
Clay, well rammed	·17	·16	·14
Earth mixed with large gravel	·19	·17	·16
Sand	·33	·30	·26

We think that the subject of the "Stability of Arches" deserved better treatment than it has received in this book; a couple of pages only being devoted to one of the most important and abstruse problems which the architect has to solve; and what is said on the subject might as well have

* "Mathematics for Practical Men." By Olinthus Gregory, LL.D., F.R.A.S., enlarged by Henry Law, C.E. Fourth edition, revised by J. R. Young. London: Lockwood & Co. 1862.

been omitted altogether, for any benefit it can be to the "practical man."

The next subject considered is that of the simplest kind of machinery, called *the mechanical powers;* these are seven in number, and form the basis of all other machines, simple or compound; they are, the lever, wheel and axle, toothed wheels, pulleys, inclined plane, wedge, and screw. Each of these has a certain *weight* to move by means of a certain *power* applied by the hand of the operator; and the number of times that the *weight* contains the *power* (each expressed in pounds), is called the *mechanical advantage* of the machine. In the case of complicated machines, the *mechanical advantage* of the whole machine is the *product* of the *mechanical advantages* of the separate or simple machines of which it is composed.

The chapters on Hydrostatics and Hydrodynamics (or the properties of fluids at rest and in motion) contain many formulæ and tables of great use to the hydraulic engineer. Under the head of Pneumatics we find a formula and table for measuring the force of wind on surfaces, when blowing at various velocities. The pressure in pounds on every square foot of surface produced by the wind blowing perpendicularly thereon at a velocity v, measured in feet per second, is $\cdot 002288 \times v^2$. For example, when the wind is blowing at the rate of 10 miles an hour, or 14·67 feet per second, the pressure on each square foot of surface is nearly ½ lb.; when at the rate of 20 miles per hour it is nearly 2 lb.; at 45 miles per hour it is nearly 10 lb.; and at 100 miles per hour it is 49 lb.

The theory and practice of the steam-engine is very thoroughly discussed, and many elaborate formulæ given for calculating the power of various kinds of engines. From these may be ascertained the velocity of the piston in feet per minute; the quantity of water, in cubic feet, evaporated by the boiler per minute; and the effective useful work performed per minute in pounds raised 1 foot of height. Also the quantity of coal consumed, and the horse-power. The power of a horse is assumed equivalent to raising 33,000 lb. a height of 1 foot per minute.

In the last chapter, on the "Strength of Materials," the author rejects all the rules which have been deduced from theory alone, on the ground that the principles on which the theory is built are erroneous; and comes to the conclusion "that we cannot deduce any general formulæ by which to determine the transverse strength of a beam of any given form of section, without knowing the position of the neutral axis, the limit to which the fibres may be extended before yielding, and the law which subsists between the extension and compression of the material and the force required to produce such extension and compression; upon none of which subjects have we any certain knowledge." Are we, then, to wait until we obtain this 'certain knowledge' before we attempt to calculate the strength of beams? The formulæ given by the most recent writers on the subject do not profess to give the exact strength of every beam to which they may be applied; but, at least, they enable the architect to make his beams of such strength as shall remove all chance of failure. With this prejudice against theoretical formulæ, our author gives only a few empirical formulæ deduced from Mr. Hodgkinson's experiments. Considering the great research into the strength of materials which has been made by eminent philosophers of late years, by whom the subject has almost been exhausted, it appears to us that the rules which have been deduced for all kinds of beams should have been given here, in order to make this part of the work complete, even though the author might have felt bound to add the caution quoted above.

The appendix contains useful tables of logarithms and of various other numbers frequently required in calculations; also a table by which the area, diameter, or circumference of any circle may be seen at once, when any one of these is given. There are also tables of the specific gravity and weight of various building materials. At the end is introduced a paper on isometrical *perspective*, or, as it should more properly be called, *projection*.

This paper was originally published by the inventor, Professor Farish, of Cambridge, in the Transactions of the Cambridge Philosophical Society. The mode of drawing which goes by this name was originally invented for the purpose of representing views of complicated machines, for which it is admirably adapted. It has also been frequently applied to the representation of buildings for which it is useful in certain cases, but was never intended to supersede ordinary perpective. In this system of projection, all lines parallel in the object are also parallel in the picture, and are drawn to the same scale, so that every portion can be measured.

LECTURES ON SCULPTURE IN THE ROYAL ACADEMY.

In commencing his third lecture, Professor Westmacott observed, that if sculpture were an art newly introduced, and only beginning to be studied and practised, it would simply be necessary to direct the young artist's attention to elementary details. As an untried art there would be no established rules or principles for the student's guidance, and the teacher would not only be uncontrolled in his mode of instruction, but would be liable to indulge in every kind of fanciful theory and speculation, the real value of which might be very problematical. This cannot be the case with our present amount of experience and knowledge to guide us. The valuable remains of the various schools of sculpture enable us to derive the most important lessons from long-continued practice; and they afford also a criterion by which we may test the soundness of any teaching offered us. Referring the student to the well-known productions of famous sculptors and schools is therefore one of the safest means of instructing him in the history, the practice, and the progress of his art.

The object of all our exertions and inquiries in this institution is to advance the success of the artist's practice. The special duty of the professor of sculpture is to care for and assist the improvement of those who intend to devote themselves to this art. In constantly bringing before the students the examples of former schools, the object is not to make them imitators or mere mechanics or artisans, but to show them, by reference to facts and examples, the effect of certain modes of practice. By pointing out to them striking characteristics, they may be induced to adopt what is really excellent, and to avoid what can be shown to be defective in any of the works so noticed. No academical teaching can make the artist feel, nor give him the true genius for art: this must be innate. But the student may be taught where to seek the causes of excellence or failure in existing works, and from such experience, palpable to the sense, draw useful conclusions for his own practice.

It must always be remembered that there are two especial grounds of recommendation of sculpture,—one moral, so to say; the other, physical. That is, the first is the object or purpose intended by the work; the second is the mode of presentation; meaning, of course, the form used as the medium of interpretation or expression. For this the best Greek sculpture is universally adopted as a standard, as it unites the finest normal forms with a profound knowledge of nature. This subject having been the theme of the last lecture, need not be further dwelt upon at present.

With the view of examining the chances of restoring sculpture in modern days to a safe and honourable position, it may be interesting and profitable to inquire what is the relation of the best modern to the best ancient sculpture; confining the evidence to the particular subject of the last and present discourse, "Form."

Of the best ancient sculpture account has already been taken. The best modern sculpture, of a great school, with which it may be fair to compare it, is that of the eminent sculptors of the sixteenth century and their followers. In their productions are found a knowledge of the human figure certainly not surpassed by the Greeks, a profound acquaintance with anatomy, facile and perfect execution, and vigour in design. These are very high qualities in art; and yet, no real judge of the essential elements of first-class sculpture would think of classifying these works with the best Greek examples. The cause of this was examined and explained to the students; and in summing up, the Professor showed where the advantage remained. In one the art was lost sight of in the result; and no one thinks of the sculptor. In the other the art is apparent, and the artist is all in all.

The subject of display, in the particular of Form, was considered at length, and especially referred to as a characteristic of later schools, and its danger pointed out; while the absence of effort to obtain notice is observable in all the best Greek sculpture. Here, then, at once, is a discernible difference, and probably a cause for the inferior success of modern sculpture. Illustrations were drawn from the best known productions of both periods; from the Theseus and Ilyssus, and equestrian groups of the sculpture of the Parthenon, on one hand, and from some of the works of Michelangelo, Gio. di Bologna, and Roubiliac, on the other. The fault seems to have arisen from the later schools not restraining themselves in the use they made of Nature, whereby they over-elaborated the parts in their statues; whereas the Greeks exercised the greatest discretion in this, studiously keeping all display of their knowledge of nature subordinate to general beauty and the harmony of the whole work.

It was noticed as a remarkable fact in the history of ancient sculpture that its later schools show a falling-off in style, entirely owing to over-attention to the particular as contrasted with the general. The introduction of portrait no doubt first led to this. Individuality came to be studied, as essential; and the study of larger characteristics no longer ruled practice. The influence of this new feeling was extended to works even of poetical or fancy subjects, and its effect was pointed out in some well-known and deservedly admired ancient works, as the Laocoon, and the statue known as the Fighting Gladiator.

In making these observations, the Professor said he had felt it desirable to draw his illustrations from works that were well known and of a former age, in order that he might not wound modern susceptibilities by bringing more recent productions into court. The object was to assist the students, not to criticize contemporary sculpture. At the same time, attention should be drawn to the tendency to lay too great stress on the minute in the present practice of art, and to the injurious effect it must have on sculpture. In this art the larger and grander features should in preference be studied. The best form does not necessarily imply, or confine the artist to naked form, but whenever and in whatever way it occurs the form should be of the very highest type. If of the human figure, it should be man, not the individual; and if drapery, it should not be a dress of a particular fashion. Of course, mere portrait sculpture must be subject to other influences than those which produce high and beautiful art; and the results will soon be apparent.

It was not intended to disparage what is really valuable in portrait-sculpture, but only to point out how a devotion to individual details may effect the larger views an artist should take in applying himself to the nobler walks of this art.

If sculpture is only to be produced in slavish obedience to the caprice of a public by no means very sensitive or well-informed on the requirements of the art, it will be both formed and dispersed by the mere breath of fancy or fashion. It will have no sure footing. It will be practised mechanically, by half-educated, incompetent, and not over-scrupulous practitioners, simply for the market; but high and noble and beautiful, like the glorious sculpture of the ancients, it never can be when exercised under such depressing conditions.

In the course of the lecture, the Professor said he should endeavour to devote one of the following evenings of his course to a very important inquiry, namely, to the class of subjects fitted for the sculptor's art. He reminded the students of the wide difference that existed between sculpture and painting, and that what one might deal with effectively, with the aid of colour, background, and perspective, the sister art, confined within the limits of absolute form, ought not to attempt, for the result could only be failure. He should think it desirable, then, to offer suggestions on this theme, under the heads of Subject and Expression.

VICTORIA.

Competitions.—Within the last month or two three several competitions have been invited for works in Sydney, New South Wales. First, for warehouse for Iredale & Co., the premium of 100 guineas was awarded to Messrs. Connor & Wilson, of Melbourne. It was highly creditable to this firm that they should call in the best non-competing professional aid to assist in the selection. The building, when erected, will prove a great addition to the street architecture of the sister city, although the requirements of the proprietors rendered it no small difficulty to prepare an elegant front, which would embrace the points they desired. The second competition was for new offices at Sydney for the Mutual Provident Assurance Institute, a very prosperous Insurance Company, on the mutual principle. For this the premium of 100*l.* was awarded to Messrs. Reed & Barnes, also a Melbourne firm. These difficulties of the site have been successfully met in the selected design, which is in the Italian style. For a third Sydney competition, offering two prizes of 150*l.*

and 75*l.*, the designs have been sent in some time. The local papers report that eleven designs were sent in, five of which were selected for the colonial architect to report upon. During a debate in the Assembly on the question of site, it was stated that the only respectable designs were received from Melbourne, and a telegram was published some ten days since, stating that rumour had it that the first prize was to be given to a Melbourne man.

The remains of the heroic explorers, Burke and Wills, are shortly expected in Melbourne, and the committee have invited designs for a marble memorial, to be erected close to the Houses of Parliament, and have accepted the model submitted by Mr. Summers, a gentleman whose abilities have not always met with that appreciation which they deserve; and he has been commissioned to carry out his design, at a cost of 4,000*l.* The principal figures, of course, are the two explorers. Burke is standing with his hand raised above his eye, as though he were looking into the far-off country, while Wills sits at his feet, with his instruments and note-book, ready to take down whatever may be remarked by his leader. Designs have also been received for monuments over the last resting-place, but no decision has yet been arrived at. It is supposed that no competitor has been rash enough to submit a design, to be executed for the limited amount, which will be satisfactory to the committee.

Buildings, &c.—A fresh start has been made with the General Post-office. The present contract will carry the work up to the capitals of the first-floor order. It is understood that the Government have ordered a floating battery, at a cost of 60,000*l.*, to be stationed at the Heads, for protection against the attacks of foreign foes. Mr. Brady, C.E., of Kyneton, has been commissioned to make the necessary survey and plan for the Coliban water-scheme, for the supply of water to the large gold-fields of Sandhurst and Castlemain. He is to receive 2,000*l.*, and will commence at once.

In the Matter of Railways.—The Melbourne (late Suburban) is now getting into good working-order, while the St. Kilda and Brighton has been taken charge of by the mortgagees. The Hobson's Bay Company are applying for extension of their powers in order to enable them to connect their line with the Government and Melbourne and to build a grand central terminus. There is no doubt the Hobson's Bay have the best site for such a purpose; and notwithstanding some show of opposition, it is expected the Bill will pass; unless, indeed, the Government promise to take the scheme up, whilst the directors of the company are willing to retire. On the Government lines two or three accidents have occurred, all arising from the grossest carelessness, but fortunately unattended with loss of life. Two on the Sandhurst line; first, near Chewton, the train running into some contractors' trucks which were left on the line; the second, one train ran into another in broad daylight, shortly after starting, when several passengers were very much injured; and the last, on the Geelong line, through the points of a siding being left open, so it is said. In this last instance, the engine went over into a cutting, and turned upside down, dragging two carriages after it, but fortunately doing little more injury than frightening the passengers. One old lady "thought she would scream, for her heart was in her mouth."

There seems to be a growing disposition to adopt fronts of variegated brick instead of stucco. The last put up in Melbourne is a new front for Tankard's Temperance Hotel in Lonsdale-street, from designs by Messrs. Crouch & Wilson.

Churches.—Mr. C. Webb has been engaged some time in adding transepts to St. Luke's Episcopal Church, Emerald-hill. The Wesleyan body are pushing forward several new churches;—at Sandhurst, a stone church, which will cost upwards of 2,000*l.*, from designs by Mr. Doane, of Ballarat: the style adopted is the Early Period Gothic;—also at Campbell's Creek, to cost 1,318*l.*; and Donnolly, to cost 668*l.* Both these latter are from designs by Messrs. Crouch & Wilson, and are after the latter part of the Early Gothic period.

Melbourne.

INFRINGEMENT OF BUILDING ACT.—We have received a letter, signed "George Adamson," denying that he is the builder of the houses in Wandsworth-road referred to in our last Number (p. 141); but as we simply reported statements made before the magistrate by the district surveyor, we must refer the writer to that gentleman.

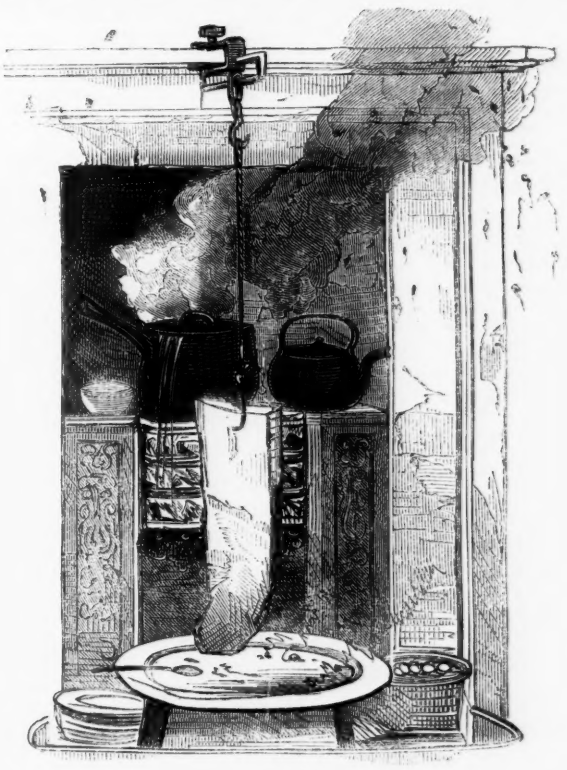
GOOD COOKERY AND BAD COOKERY FOR THE MULTITUDE.

THE unsatisfactory and wasteful system of cooking, or rather want of system, which prevails amongst the industrious and poorer classes of this country, is an old subject of complaint with us. In the ill-constructed houses in which thousands of the working population of the metropolis live, the waste in cooking is enormous; and this is caused partly by the unsuitable formation of the fire-places, and want of knowing how to manage plain, wholesome, and economical cookery.

The practice of filling with several families a house which was intended for only one, prevents the possibility of any proper arrangement for cooking in the kitchens of those houses. There is ample provision for preparing a dinner: there are boilers and ovens which are of daily use to a family, but unfortunately this accommodation is only available for the use of one tenant, the remainder of the persons living in the house being obliged to manage as well as they can with fire-places which have been intended to warm parlours, bed-rooms, or drawing-rooms.

We have made a careful sketch in one of such rooms, the truth of which will be recognized by thousands of well-paid artisans and other workers in the metropolis. The fire grate is not more than 10½ inches in width, and in height 7¼ inches. In this instance—and it is one of a multitude—there were not more than 3 inches or 4 inches of space on each hob. In order to get the vegetables ready, it is necessary to place the pan in such a position that it covers nearly the whole of the top part of the fire, and this prevents the roasting of the meat, and generally leads the smoke to fill the apartment and cover everything in it with flakes of soot. There is barely room for one pan on the fire at a time; and if potatoes and cabbages are to be made ready for the Sunday's dinner, they must be boiled one after the other, and one vegetable is sure to be spoilt by being kept waiting. Few joints of butcher's meat can be found to fit those wretched cooking-grates. A neck or breast of mutton is far too long and only part of it is touched by the fire at one time; and other joints are equally difficult to manage. It is not to be wondered at, under such circumstances, that the temper of housewives becomes ruffled, and that husbands are glad to get out of the way until dinner-time. Even then matters are not satisfactory: for in nine cases out of ten the food, when put upon the table, is neither pleasant to the sight nor cooked with advantage. Even in connexion with fire-places of this description good dinners for small families might be cooked with the help of a "Dutch oven," and other contrivances of a similar kind; but these appliances are used by few.

When all this muddle, confusion, smoke, waste,



COOKING AND WASTING.

and ill-temper are caused by cooking in a room of this kind, it is not to be wondered at that the bakehouse is extensively patronized on Sundays. Into the public ovens go all kinds of meat; pork, beef, mutton, geese, and other matters; and it is certain that by this process a large amount of the nutritious qualities of the food is wasted, while the flavour of the varieties of butcher's meat must be assimilated.

In various ways the science of cookery has made advances: in workhouses, prisons, and hospitals, the saving which has been effected by improved apparatus, and by the preparation of food on a proper plan and on a wholesale scale, is enormous. The cost per head at which persons can be properly maintained is thus considerably diminished. The articles are obtained from the cheapest and best markets, and everything is put to its proper use with the least waste. In the army, Captain Grant's apparatus, and that of Messrs. Benham & Son, are doing wonders: besides the large sums which they are the means of saving, in consequence of the soldiers being enabled to obtain a variety of well-cooked food, such improvements tend to improve health and lengthen life.

In the royal kitchens at Windsor and Buckingham Palace, in the kitchens of the great West-end club-houses, and in the large mansions of many individuals, a good description of cooking apparatus has been introduced, and due regard is paid to economy in the nutritious qualities of the various descriptions of food.

In some important families, and in some hotels, the waste of food after it has been dismissed from table is shameful. Good provision, which would gladden the hearts of hundreds of poor persons, and which could in many ways be made most useful, is thrown into tubs and sold with "pig-wash." A perquisite by this means falls to the share of certain of the servants. Those who know the terrible poverty which prevails in Bethnal-green, Spitalfields, and other parts of the metropolis, cannot but regard this waste as a sin, and would urge, although it may not be in accordance with modern custom, that masters and mistresses should themselves look into this matter.

In some of the public schools a reform of this system of cooking is much required: take, for instance, the Blue Coat School, where, for the most part, the meat is baked, and there is but little variety in the food. On ship board—particularly in the Royal Navy—there is also room for improvement in this respect. When a ship is at sea, the choice of provisions is by force chiefly confined to salt meats; but in port there is no necessity for this. In several of the old-fashioned taverns in the City the plan of cooking is antiquated and expensive, and there are but few places in which a working man can obtain a good dinner at a cost which he can afford to pay: the consequence is that he is generally obliged to take

each day a bundle of provisions that have been cooked at home in the manner to which we have referred, and at dinner-time go to the ill-ventilated tap-room of a public-house, where he must, of course, spend a certain amount on beer for very indifferent accommodation.

Look in what direction you may throughout the metropolis,—and the same may be said of the chief of our large provincial towns,—you will find no adequate provision made for well and cheaply feeding a vast portion of the community. And in London especially there is but little opportunity for properly preparing food at home.

The advantage of cooking with the aid of proper apparatus, on a large scale, has been proved in various ways besides those to which we have referred. In Lancashire, during the prevalence of the present distress, many useful lessons have been learned, and persons have been surprised at the large number who can be fed, by proper management, for a comparatively small sum of money. In Glasgow, as we have already mentioned, a movement has been made, which we look to see followed in the metropolis and elsewhere. Already the matter has been taken up in Manchester; and so far as experiments have been made, the fact seems to be established that self-supporting cooking depôts, on a handsome scale, can be established for the use of the working classes.

More important, however, than this it is that knowledge on the subject of cooking should become general, and that the means of cooking properly, and with the greatest effect at the least cost, should be brought within reach of larger numbers than is now the case. We have no wish to see the family circle broken up, or any place made more attractive to an Englishman than his own fireside.

RECENT ARCHITECTURE IN BIRMINGHAM.

A CRITIC of the art wishing to arrive at some definite conclusion respecting the recent progress of our architecture could not do better than pass a few days in the examination of the new buildings of some large and influential country town. The metropolis forms too vast an area for a rapid critical survey. Remarkable edifices of recent erection are too far asunder for ready and immediate comparison; and the metropolitan works, except as to scale, do not always form the best or most important samples of modern architectural art.

It was with these convictions that the writer thoroughly enjoyed a recent stroll through the streets of Birmingham, in many of which new buildings of imposing dimensions have recently sprung up in the form of merchants' warehouses, extensive manufactories, stacks of buildings affording shop-frontage below and exhibiting architecture of palatial magnificence above, which, with a goodly number of new churches, new schoolhouses, and buildings of various other kinds, form in the aggregate as good a field of observation as could be devised for the modern architectural critic.

The somewhat older buildings of the town that were thought to exhibit such signs of architectural advance some score or ten years ago, now serve only as marks to indicate the progress which was then beginning, and which has now left those works far behind in the general artistic improvement of the country at large which has since been taking place. There is the façade of the Free Grammar School, for instance, one of the early (though not among the earliest) modern Gothic designs of Sir Charles Barry. There is a poverty about it that, to the artistic eye instructed by twenty years or more of subsequent advance in the art, is unsatisfactory; and yet it must be conceded that it was one of the best works of its day, and that Sir Charles Barry was one of the chief founders of the present school of modern Gothic art. Then there is the restoration of St. Martin's spire, at the bottom of the Bull Ring, the work of another eminent London architect, and of much more recent date than the Free Grammar School, but which yet presents similar defects of treatment.

It is sometimes urged that if reproduction be *accurate*, the effect of the new work must be *identical* with that of the old. But this is not necessarily the case. For instance: we will suppose that a modern Italian artist has produced a copy of Raffaelle's Transfiguration. A critic pronounces it inferior to the original. The artist calls for compasses; measures the eyes and noses of his own work, and compares their relative dimensions with those of the original picture: they agree to a hair's breadth. The blue, red, or grey draperies are of precisely the same intensity—even the folds identical. Not a feature—not a detail, can be proved to be mechanically different. The modern artist is, perhaps, satisfied that such tests prove the equality of his pencil to that of Raffaelle. But yet the critic is not convinced, however conclusive the tests applied may appear to the copyist. It is true that there is not a strict analogy between a picture and a building, but such as there is, is amply sufficient for the purpose.

The Town Hall, a building in the modern Classical style, belongs to a period now more than twenty years past, and but for its noble dimensions and noble simplicity, it might be as severely criticised for being below its classical models, as the Gothic buildings referred to are below their Gothic ones. The grand and truly monumental scale of this building, however, notwithstanding its many shortcomings, renders it still the most important in the town. But many recent works of far inferior scale and pretension, abundantly prove that, should the occasion offer, more than one Birmingham architect might be found to endow the town with a finer building than the Town Hall.

Among the new churches two especially are worthy of a much more detailed character than can be allotted to them in the brief space of the present article, namely, the Wickliffe Chapel in the Bristol-road, built for a Baptist congregation by Mr. Cranston; and the new Unitarian Church in Broad-street, designed by Mr. Bateman. The Wickliffe Chapel, taken as a whole, possesses, as one of its especial distinctions, that stamp of solidity and completeness which invariably distinguishes good ancient examples, which is so seldom found in modern reproductions of the Gothic style. There is a quaint feeling, amounting almost to originality, about the design of the windows; and also in the delicate and graceful, but sparingly introduced ornaments. The interior of this church is very elegant. It has also the merit, considering the material, to have cost no more than 7,000*l*.

The new Unitarian church, built from designs by Mr. Bateman, has one ingenious peculiarity about it which must not be passed over in silence. This consists in the unusual nature of its foundations. When it was determined to build a new church for the Unitarian congregation, instead of the one in the centre of Birmingham, it was thought that Broad-street, which unites the fashionable suburb of Edgbaston with the main town, was the most eligible situation. But after every attempt to procure a site, it was found at last that none could be found at anything like a reasonable amount of cost along the whole length of that important line of road. It was, however, suggested that, at the point where the bridge over the canal occurs, an adjoining bridge, or archway, might be erected, sufficiently strong to carry the entire structure. This project was found to be workable, and was promptly carried into effect; and when the high parapet wall of the old bridge was removed, and the façade of the church was found running parallel with the existing footway, no one would have guessed that the new edifice was built over the canal, especially as the wall on the opposite side of the roadway is so high as to keep the water quite out of sight. This is probably the only example of a highly decorative church capable of holding something like a thousand people being artificially supported at a considerable height above a line of busy water traffic that passes beneath its whole length. It is true that the bridges of the Middle Ages, when few existed, and the number of passengers crossing them was proportionately large, offered such great temptations to build shops upon them as was almost irresistible; and we know, in fact, that the temptation was not resisted, as proved by the Rialto at Venice, the old bridge at Florence, still gay with its jewellers' shops, our own old London Bridge before the fire, and many others. In such cases, too, we also know that a small chapel often occupied the centre; but the erection of a large church capable of containing a congregation of something approaching to a thousand people in such a situation, cannot, I think, be cited. The Unitarian church extends, supported on its own archway, parallel with the whole northern side of the old bridge, at some little distance from the footway, and is, beyond comparison, the most remarkable structure in the entire line of Broad-street to its termination at the Five Ways. The steeple is elegant, and stands to the right of the doorway.

The doorway is formed of a recessed porch, approached beneath three highly enriched arches, supported by double columns of polished red granite, the colour of which is richly brought out by the deep shade of the porch behind. The arches support three Decorative gables, each terminating in a finial, and united by a sort of connecting parapet, after the manner of many French examples of various periods; the whole surface of the parapet being enriched with diaper work of quatrefoils. The effect of this entrance is, however, somewhat marred, and rendered inconsistent by the coarse rustication of the whole surface of the adjoining walls. The contrast becomes too harsh, between utter rudeness and almost overwrought ornamentation. The window tracery of this building is quaint and pleasing, but the manner in which the blank space beneath the rather broad windows is filled up by a little parasitic buttress cannot be defended. If in consequence of some peculiarity of structure which cannot be externally traced, some additional strength became necessary at these points, it should have been applied in some (seemingly) less objectionable manner. We admired a stack of buildings by Mr. Gibson, in Bennett's-hill, but have not space to describe it.

Some of the most noticeable among recent examples of street architecture in Birmingham (though not always the most praiseworthy) are those which aim at producing their chief effect by means of different coloured bricks—red, black, cream-colour, and brown, being the colours employed; and larger bricks being used in archwork and the structural positions of importance.

Returning from our visit to the Unitarian Church, we passed the first favourable specimen of this style which came under our notice. At the corner of Bishopsgate-street, a small front garden has been built over, in order to turn to account, in the form of a grocer's shop, a valuable and conspicuous corner. The new shop, like some of those built over the gardens in the Marylebone-road, has nothing above it; and its façade terminates above the windows in a border of low Gothic gallery work. The style of the composition may be termed, to use a general term, Italian Gothic, and slightly calls to mind the famous Loggia by Orcagna, on the Piazza Vecchia at Florence, and the porch of a Venetian church which we well recollect; but the conspicuous use of bricks of different colours more strongly reminds one of those well-known edifices of the older parts of Genoa, which are composed from base to summit of alternate layers of black and white marble, marking the entire building with a series of horizontal stripes, which have a much more pleasing general effect than might be imagined. The windows of the structure under description are formed on each front by an arcade of semicircular arches, while the doorway at the angle is a Pointed arch of very sharp character, which produces a good effect, and one that seems perfectly natural. The structure of the arches consists, apparently, of properly-moulded pieces of terra-cotta, of large size, which are alternately deep brown and pale cream colour, the key-piece being brown. This archwork is strengthened in appearance by another arch, formed in small red bricks, immediately above it and adjoining it, the main surface of the wall beyond being of pale cream-coloured bricks of small size and beautiful manufacture. These arches are supported on slender Gothic columns of the same rich tone as the portions of brown in the arches themselves. They stand on a basement of cream-coloured brickwork, strengthened in effect (if we recollect rightly) by a strong line of graduated colour formed by a row of black bricks and row of red bricks joining each other, the black undermost. The effect of the whole composition is pleasing; and, were all the effects legitimately obtained, it would form a good example, on a small scale, of the artistic use of brick; for different-coloured columns of baked clay, and the use of differently-sized and differently-shaped bricks in various parts of the building may be considered quite a legitimate extension of the true domain of brickwork. But in the present example much "sham" supplies the place of what might easily have been the real thing represented. For instance, the large alternating masses of red and brown are not, as they appear, masses of baked clay, of alternately brown and cream colour, but merely painted stucco. Nor do they form the real structure of the arch, as they appear to do, but are merely outside show, the arch being built of ordinary brick cased in Roman cement, and then coloured in this deceptive fashion. The general effect produced by this design of Mr. Naden serves, however, to show what might be done by more legitimate means. This artificial colouring is produced by M. Sezerelmy's material, which, as readers of the *Builder* know, has been tried as a preservative on the stonework of the Houses of Parliament. It

will be well to watch its effect on the cement-work just described.

A much larger and altogether more important application of the coloured-brick style (concerning which architects are running wild) is exhibited in the stack of buildings recently erected after the design of Mr. Chamberlain (professor of architecture in Queen's College, Birmingham), at the corner of Union-passage, in Union-street. The general style upon which the main lines and features and the distribution of parts are based, is that of the Palatial Gothic of Venice. The materials employed, however, necessitate a sufficiently distinct kind of treatment, and the requirements of an extent of glass frontage in the basement have led to still wider departure from the principles of Venetian Gothic. The top line of the building is varied by the pointed gablets of a series of well-designed dormers. Below this pseudo-attic effect is a cornice, intermediate in style between Gothic and Classic, in the fascia of which is an inlay of a Vandyke pattern, formed of plain glazed tiles, of small size, fitted to the pattern, which only consists of three plain colours, green, red, and white. Below the cornice are the windows of the upper floor. They are formed by pointed arches, sparingly decorated and grouped in threes or fours, after the Venetian manner. Below these is a string course, the chief effect of which is produced by different-coloured bricks, the tones of which tell out well against the self colour of the general brickwork of the façade, and form a quaint and not unpleasant contrast with the plain stucco dressings of the columns and arches of the groups of windows. The windows of the principal floor are larger and richer in design, and the self-coloured arches of the cement dressing are made to blend in effect with the general brickwork, by means of a superadded arch formed of red and black bricks in alternate masses. The arches of the shop-windows of the basement, in order to obtain the largest possible quantity of light, are very flat ellipses of great span, squared at the springing in order to obtain a little angularity of effect in accordance with the Pointed character of the features above. These elliptic arches are probably artificial and exist merely on the surface, the real support for the superstructure being obtained by horizontal beams or brestsummers, as in ordinary shops when nearly the whole lower frontage of the building is required to be glass. The elliptic arches just described are enriched with encaustic tiles, and are supported on clusters of Gothic columns, which impart to the arches the appearance of really doing the duty which we presume they only pretend to do. The same architect designed the tower of the new waterworks, in which also effects of colour are obtained by means of varied bricks.

There is another specimen of party-coloured brickwork in Great Hampton-street, which is somewhat raw and course in its effect, but is yet bold and bright. It has, moreover, the additional advantage of being economical, the whole stack of building, comprising four or five shops, with fine lofty houses above, having cost no more than 2,500*l*. Mr. Bland was the architect. The pointed arches of the pseudo Lombardic-Gothic, which has been adopted as the basis of the style of this building, are rendered effective by means of their structure, with long and very narrow bricks, in groups of three or four, alternately black and cream colour.

Of buildings formed of a successful combination of brickwork of the usual kind, enriched with stone dressings, there are several recently erected which take fair rank. We may mention especially a stack of buildings in Bull-street, destined for retail shops, with living-rooms, or offices above. The brickwork of these buildings is deep red, in contrast with which the stone dressings produce a strong effect. The designs of the window dressings are carefully studied. The most notable and noteworthy characteristic of this piece of architectural design is the result of the determination which the architect has shown not to exhibit a massive superstructure apparently resting on the fragile support of a sheet of glass, as is so commonly the case in street architecture, where conveniences required by retail shops are the all-important feature to be studied by the architect. The windows themselves are so good that passengers must be attracted to stop and admire them, and they are very probably more advantageously influenced by the smaller, but, of course, more select display of goods in the narrower compass here afforded, than by the gaudy and profuse exhibition of less choice articles, which go to fill up the wide expanse of the usual wide-spread glass frontage. A similar stack of buildings, but of rather a distinct style of Gothic, has sprung up in Carrs-lane, after the designs of Mr. Charles Edge. The German Domestic Gothic, as exhibited in some of the fine old houses of Cologne and Augsburg, has probably furnished Mr. Edge with the basis of his style. The chief distinctive feature of this pile of building arises from the massive effect of the window dressings, the entire upper part of each pointed head of his window openings being formed of a single piece of stone, supported at the sides on the main walls, and in the centre by a slender column. The head of course forms a kind of stone lintel, and precludes the necessity of constructing an arch for the support of the wall above; but Mr. Edge has, nevertheless, surmounted the lintel with a superfluous arch, worked in bricks, alternately grey and white, which appears to unite the effect of the stone lintel with the general brickwork in a pleasing manner. The lower part of the stone lintel is cut up into the form of a double arch, enriched with good mouldings, the centre resting on the column which divides the window into two compartments. A great space of this stone lintel is, however, still left intact by the cut-up arches, and the broad plain expanse of the stone is only very sparingly ornamented by a small decorative circlet, and three delicate *fleurs de lis*, or as in the second tier of windows simply by the circlet, from which a small but well-carved head projects.

In the Italian palatial style of the Renaissance, Birmingham may boast of some good examples, both in stone and stucco. Mr. Thomason, a descendant of the well-remembered Birmingham celebrity, Sir Edward Thomason, was the first to erect a building of this kind in his native town. It was, indeed, the appearance of his works, which gave that impetus to the progress of architecture in Birmingham which is now exhibiting signs of development. Mr. Thomason's favourite features of the style appear to be, first and foremost, the great Farnesian cornice, which he has, however, almost always surmounted by an attic, varied in top line by dormers, which have sometimes a good effect. Secondly, his upper tier of windows, immediately below the cornice, is generally formed by a series of connected arcades, a portion of which are blanks, while others serve as frames for the lights of the upper rooms, the columns of these arcades being generally of polished granite. His principal tiers of windows are more or less in the usual style, and the basements are of course modified (more or less successfully) to meet the exigencies of shop-fronts, except in those more fortunate cases where they are not required. The richest example of Mr. Thomason's works in this style is perhaps the mass in Union-street, the cornice of which appears rather too heavy, in consequence of the return finishing too suddenly,—a common defect in the style when pressed into the service of close street architecture, in which the cornice only appears in the frontage, instead of forming a complete crown to the whole mass of the building, as it does in the case of the Farnese Palace, and nearly all the fine Italian examples of the style. This building is entirely cased in stucco, with small polished granite columns to the upper arcade of windows. The most monumental example of this style, as being entirely of stone, instead of imitative stucco, is the building now erecting by Mr. Plevins, for offices of the Birmingham and Staffordshire gas-works. This edifice stands in the old square, dwarfing in a remarkable manner all the houses around, which were once ranked among the most important in Birmingham. In the design of this building there are many details well worthy of description; but the general effect, and that which most satisfies the eye of an architect, is a stately simplicity of character, not very easy of attainment, which pervades the whole. Mr. Plevin is also the architect of the Quakers' Meeting-house.

Mr. Payne is another Birmingham architect who has adapted the Italian palatial style of the sixteenth century to the requirements of ordinary street architecture. The pile of buildings known as the Royal Chambers, which he has recently erected in Temple-row for Mr. Charles Couchman, may be pointed to. The windows of the principal floor show conscientious study. The design of this architect for the projected Birmingham Club, at the top of New Hall-street, is on a more extensive scale. The present position of the principal entrance is a defect which, it is to be hoped, may be got rid of.

Many other buildings recently added to the architecture of Birmingham might be noticed, but the extent of space already occupied prevents further extension of the subject just now.

THE ALBERT MEMORIALS: ST. GEORGE'S CHAPEL, WINDSOR.

THE great east window in St. George's Chapel, with its newly-wrought stonework of fifteen lights in width, and four tiers in height, is being filled with stained glass by Messrs. Clayton & Bell, and will be dedicated in the following inscription to the memory of the late Prince Consort:—

"*In honorem Dei et in desideratissimi Principis memoriam, hanc fenestram Decanus et Canonici mœrentes ponendam curaverunt MDCCCLXIII.*"

The subject-matter of the window comprises the incidents of the Birth (adoration of the Kings), Resurrection, and Glory of our Lord. To these are devoted the central positions on each tier; each subject occupying seven lights in width. In the side lights, four on each side of the window, are introduced, tier upon tier, the following selection of apostles, prophets, and worthies of the Old and New Testaments. *In the lower tier*, Asa, Jehosaphat, Hezekiah, Josiah, Nicodemus, Gamaliel, Timothy, The Good Centurion. *In the second tier*, Abraham, Joseph, Samuel, Daniel, St. John, St. James Minor, St. Bartholomew, St. Barnabas. *In the upper tiers* are introduced the twenty-four Elders casting down their Crowns before our Lord, the three Archangels, and various groups of angels, cherubims, &c. *At the base of the window*, and in immediate connexion with the inscription and the armorial bearings of the Prince, is a tier of fourteen small subjects representing an ideal princely figure—in which portraiture is avoided—engaged in various acts of public and domestic worth. The idea therein embodied is princely interest in Agriculture, Science, Learning, Art, &c. The series comprising the central division is devoted to scenes of private life. The window promises to be the best work of the artists.

The Wolsey Chapel adjoining St. George's is to be restored and decorated in a sumptuous manner in memory of the Prince at the cost of the Royal children. The artists already named are to design and prepare the cartoons for the elaborate decorations of its roof and numerous windows which are to be filled with stained glass. The roof decorations in mosaic work will be carried out in accordance with these designs by Dr. Salviati, of Venice. The works are to be spread over a considerable period of time, and will cost, perhaps, 25,000*l*., although the edifice is very small.

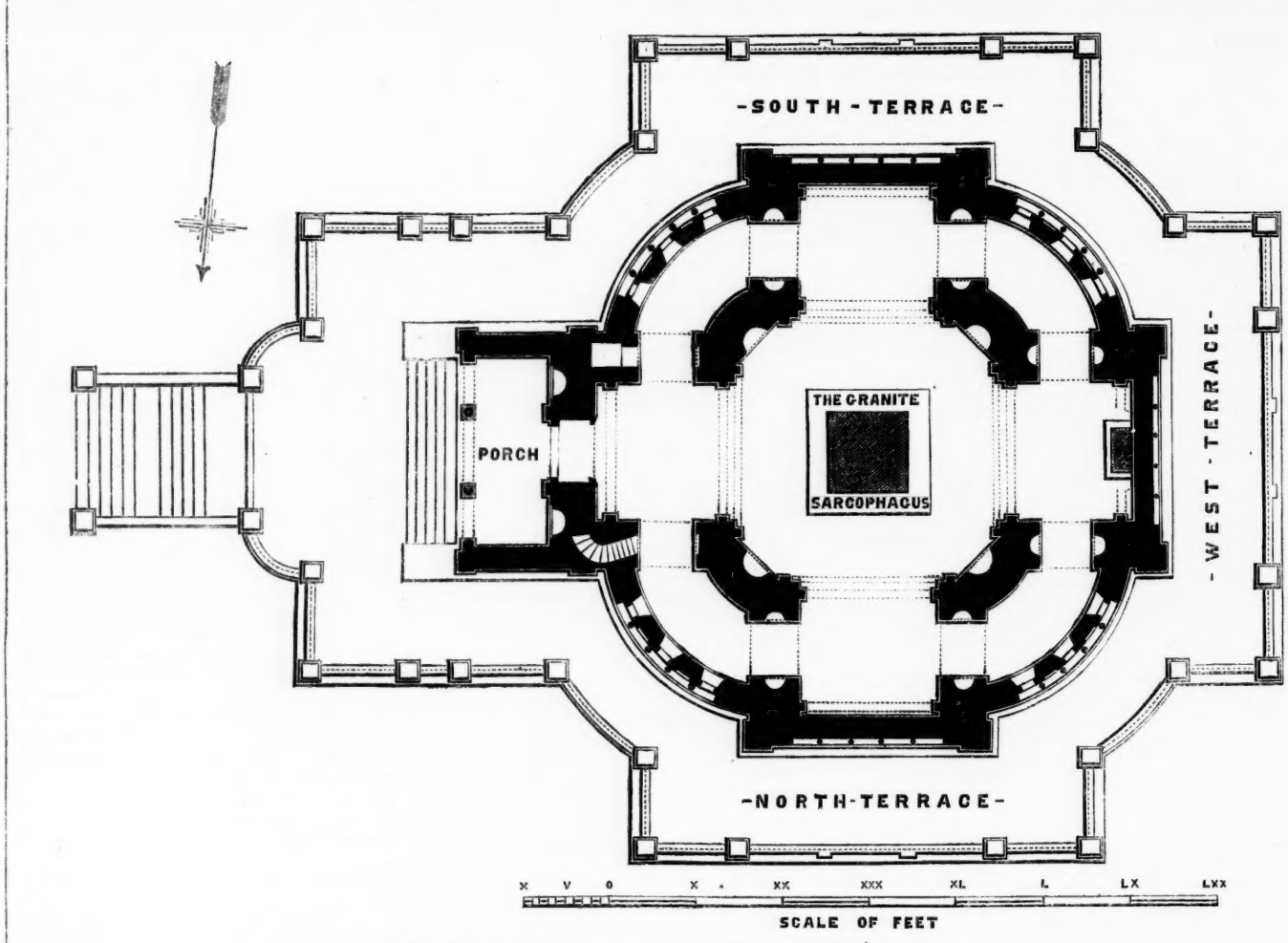
Wolverhampton.—Photographs have been prepared of the model of the intended military equestrian statue of the Prince for Wolverhampton, which is to be erected on the pedestal now surmounted by the Russian cannon in High Green. Mr. Thorneycroft, the sculptor, has been intrusted with the work. This gentleman, after he had been instructed by the committee, informed the Queen of the nature of the commission, and her Majesty was pleased to express her gratification. The estimated cost, including the alteration of the present pedestal, will be 1,200*l*., of which sum 400*l*. yet remain to be subscribed.

Newport.—A simple monumental tablet to the memory of His Royal Highness, and executed by the Baron Marochetti, has just been erected by public subscription in St. Thomas's Church, Newport, Isle of Wight, between the two stained-glass windows presented by her Majesty and the Prince. It occupies but a very little space, and consists of a white marble bust of the latter *in relievo*, on a crimson ground, surrounded by a framework in black marble, with a carving of laurel-leaves around it. A gilded German crown surmounts the whole, and his official bâton of office lies in front. Beneath appears, in letters of gold, the single word "Albert," an enlarged autograph of his usual signature. The cost is said to be 200*l*.

MANCHESTER ALBERT MEMORIAL.

THE question of a site for the Albert Memorial (which, it will be recollected, consists of a marble statue by Mr. Noble, presented to the city by the late mayor, Mr. Goadsby; and an ornamental stone structure, designed by Mr. Thos. Worthington, architect, to inclose the same, the cost of which is defrayed by public subscription) seems to have received a satisfactory solution, as briefly stated last week.

It had been proposed that the memorial should be placed in the Infirmary grounds, either immediately in front of the centre of the Infirmary, or at one side, near the Queen's Hotel, in Port-



THE ROYAL MAUSOLEUM, FROGMORE.—*Plan.*

land-street; but it appears that the trustees of the Infirmary were not able to give a title to the Memorial Committee to place the statue within the grounds unless pecuniary compensation were given. As the Manchester Corporation did not feel themselves justified in undertaking the responsibility of this compensation (which, we are informed, was equal to an annual rental of 100*l.*), it has been proposed by the Improvement Committee of the Corporation that the memorial be placed on the space in Bancroft-street. The Memorial Committee have accepted this offer of the Corporation, on the condition that the proposed square to be formed in Bancroft-street be kept permanently an open space. It is proposed to obtain Parliamentary powers to remove the block of building known as the Engravers' Arms, so that a square would then be formed 95 yards by 69 yards, in the centre of which the memorial would be placed. The advantages of the site now proposed, and which may be considered adopted, are stated by its advocates to be,—that it is central, being within a few minutes' walk of the Exchange; that the square will be so spacious that excellent views will be obtained on all sides of the memorial; that it will be approached by a number of excellent streets; that one side of the new square will be bounded by land belonging to the City Corporation, which may at a future time be used as a site for the erection of a new city hall, or other large public building, in front of which the ornamental memorial will be most appropriate; and that the formation of the square will afford another central breathing lung for fresh air to the city.

The Manchester Albert Memorial will be found fully illustrated and described at pages 804 and 805 in the last volume of the *Builder*, to which we refer our readers.

THE PROCESSION THROUGH LONDON.

THE carpenters and gas men are hard at work in London preparing seats to view the procession of the Prince of Wales and the Princess Alexandra, from the Bricklayers' Arms Station towards the Great Western. The decorators' turn will come next. Under the direction of Mr. Bunning, a triumphal arch is being erected at the foot of London Bridge, and seats are being formed around St. Paul's and in front of the Mansion House. The decoration of Temple Bar is also in his hands. The construction in St. Paul's Church-yard is of great extent and corresponding strength. It is wholly roofed over, with a projecting roof in front, and will be fittingly adorned hereafter. Around the churches in the Strand also, and in every other available position, seats are being erected.

In Southwark, too, justly jealous of its ancient rights and duties as a borough, triumphal arches will be raised and suitable decorations provided.

As to the illuminations, some experiments have been made in Edinburgh with the view of marking out the architectural lines of buildings, and should be inquired into by those concerned with our public buildings here.

One correspondent suggests that every householder should light up the *interior* of his rooms, keeping the blinds up; and another that the dome of St. Paul's should be illuminated.

THICK AND THIN BEDS AND JOINTS IN BRICKWORK AND IN MASONRY.

THE use of thin or of thick beds of mortar, in brickwork and in masonry, must, in a great measure, be governed by the character of the work and the quality of the materials. Marble, if moulded, carved, and even if plain, but polished, must have fine beds and joints. Ashlar masonry, as in the New Houses of Parliament; in the Reform Club, Pall-mall; in St. George's Hall, Liverpool; and, in all masonry of this class, must have thin beds and joints. The best class of brickwork and terra cotta work, plain or enriched and moulded, must also have thin beds and joints. As a general rule, it may be stated that buildings, whether of marble, of limestone, of sandstone, or of brickwork alone; or of brick and terra cotta combined; which are ornamental in character; enriched by carving and mouldings, or plain on surface, but polished or tooled, must all have thin beds and joints. Thick beds and joints of mortar would destroy the harmony of design, by deteriorating the appearance of labour bestowed on the marble, stone, or brick and terra cotta, in such buildings.

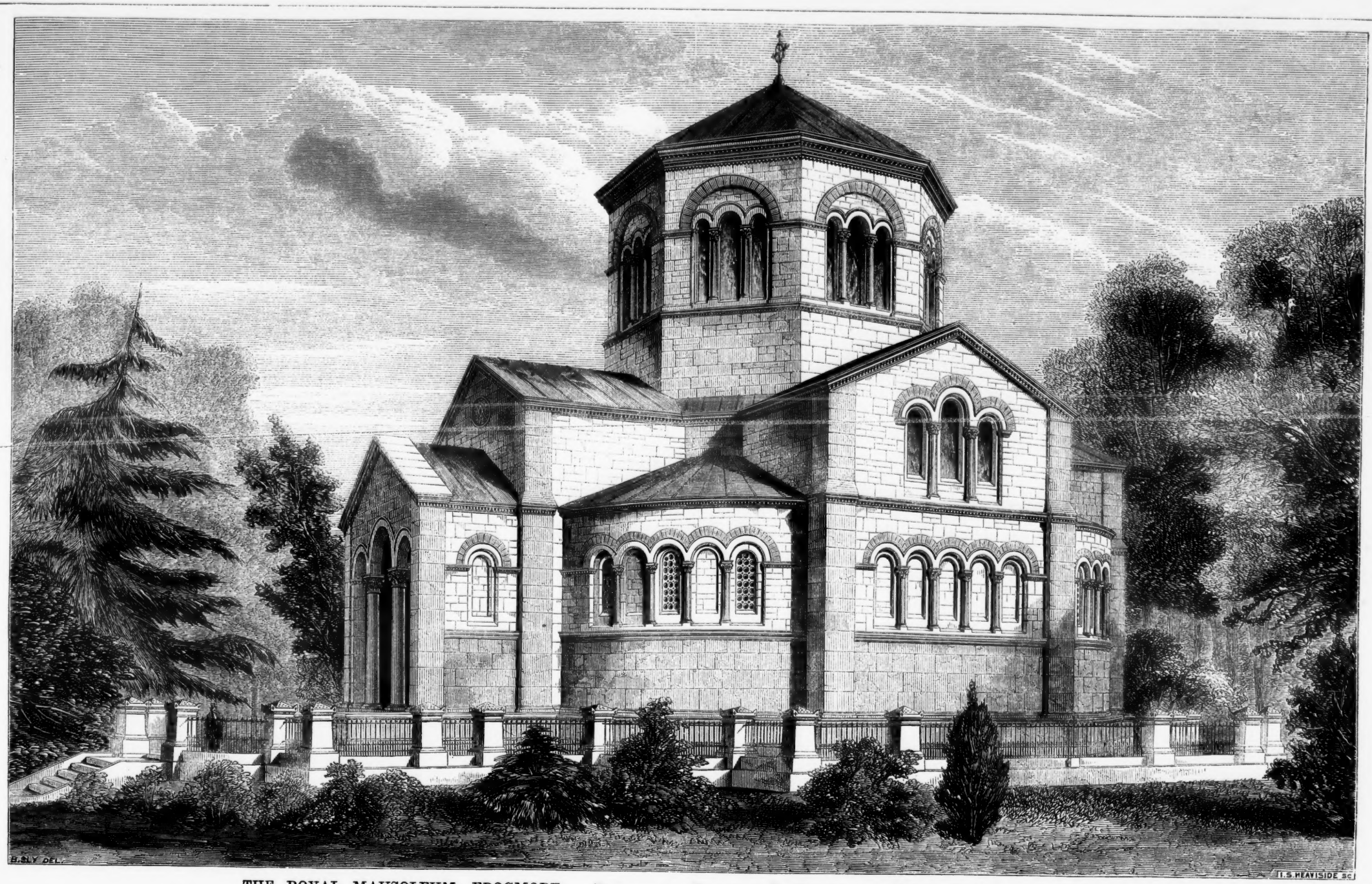
The Romans used "tiles." That is, Roman bricks are (many of them) square, like tiles, say 6 inches by 6 inches, or 9 inches by 9 inches, or 12 inches by 12 inches, and 1 inch, 1½ inch, or 2 inches thick. In many Roman buildings now existing such bricks or tiles may be seen, set in beds of mortar almost of equal thicknesses to the tiles. In the East generally (Constantinople), as also in Spain and in Italy, this class of work exists; in ancient buildings as likewise in those most modern. Tanks, towers, minarets, domes, arches, and walls, may be examined, in which bricks and mortar have almost equal proportions. Where the mortar is good, such buildings are sound after centuries of wear, neither the action of the elements nor the violence of man having wholly destroyed them.

In modern practice, in all masonry and brickwork, where strength is required rather than ornament, thick beds and joints, of good mortar, will be useful. Thin bricks or tiles will also be better than thick bricks, as the material will be better burned, and consequently more enduring: more mortar can also be used, which in such work gives strength.

Mortar may be used safely, and even with advantage, in thick beds and joints in masonry, for docks, for railway-bridges, viaducts, and retaining-walls; as also for warehouses, goods stations, cotton-mills, tall chimneys, fence-walls, and all similar structures. Reservoir-walls, tank-walls, and covering arches for waterworks, ought most certainly to have thick beds of good mortar.

The proportion of mortar to rubble-stonework, should be about 1 to 3, that is, in 4 cubic yards of rubble-wall there should not be less than 1 cubic yard of mortar. In brickwork (ordinary bricks), the proportions will be 1 to 4. If thin bricks are used, or if very small stone is used for rubble-work, the proportions may be as 1 to 1, like some of the work to be found at this day in Italy and in the East, which ancient work is sound after centuries of time; and all the destructive agencies of the elements, of man, and even earthquakes, have failed to destroy such work in many instances.

Much may be said as to the disadvantage and danger of building hybrid work;—that is, injudicious mixtures of ashlar, rubble, brickwork, and concrete. But a treatise would be required, illustrated by many diagrams, fully to detail all that may be said on this most important part of masonry. ROBERT RAWLINSON, C.E.



THE ROYAL MAUSOLEUM, FROGMORE.——Designed by Professor L. Gruner and Mr. A. J. Humbert, Architect.*

[* See p. 145, *ante*.

FRANCE AND BELGIUM.

THE Bank of France has just obtained from the town of Paris authority to dispose of all the site occupied at present by the Rue Baillif, containing more than 200 mètres, to construct necessary annexes for the service of that institution. An engagement is also entered into by which the bank authorities are to construct houses bordering the new street, which is to be 20 mètres wide, to replace the Rue Baillif, and place the Rue Croix des Petits-Champs in direct communication with the bank.

In examining the works of the Pont de Charenton, which we had not visited for several months, we remark that they have been vigorously carried on last season, the masonry being nearly up to the level of the roadway.

By means of a small tramway, worked by a locomotive and two iron cranes, heavy blocks are lifted out of the waggons and deposited with the greatest ease in their proper places.

This bridge, which crosses both the Marne and the Canal joining the Seine with the Rhine, consists of four arches, three for the river and one for the canal. The span of the latter is considerably greater than that of the others, and the design is one of surprising boldness. The species of promontory separating, below the old bridge, the principal branch of the Marne from the smaller arm (now canalized), has been lowered at its extremity, and serves as a base for the first right-hand pier of the new bridge. This tongue of land will be levelled evenly as far as the bridge which carries the Lyons line; and will form, throughout its length, a mole or jetty similar to that separating the Seine from the canal near the Monnaie Lock.

The reconstruction of the Pont de Charenton is one of the principal enterprises of this class undertaken in 1862. The other analogous works are the enlarging of the Pont du Saint-Esprit, over the Rhone; the construction of the Pont de Belle Croix and the Pont de Perinel, over the Loire at Nantes; and the Pont de l'Albi, over the Tarn.

In the department of Somme, the Minister of Public Works has authorized surveys to be made for a railway from Achiet to Ham, by Bapaume and Péronne. This branch line, intended to unite that from Arras to Hazebrouck, Calais, and Dunkirk, with the Chemin de Fer de l'Est, traversing a fertile and industrious country, will be of considerable interest, both as regards the international traffic and the development of the coal-fields of the Pas de Calais.

It is worthy of note that about the middle of December, 1862, gas made its appearance in the steeple of Saint Malo, at the greatest height to which that mode of illumination has been practically adapted in France to a building. It illuminates brilliantly the four dials of the Cathedral tower, which stands at a considerable elevation far above the town and roadstead, constituting a prominent object from the sea and roadstead.

The inhabitants of Brussels, justly proud of their fine promenade, *l'allée verte*, have lately been in great trouble about its being ruined by the passage of a branch railway through the middle of it. This celebrated promenade was even held sacred during the memorable siege, when deputations of ladies invoked the protection of the Maréchal de Villars to save their favourite pleasure-ground. It was on this occasion that Louis XV. decorated Mannekin with his order, and he was presented with a complete costume, still preserved as a relic. Owing to the numerous protestations against the encroachments of the railway, and the strenuous efforts made by persons of the highest influence to prevent this act of Vandalism, as the Brussels ladies called it, the several projects before which the promenade was to be sacrificed have been abandoned.

The works of the railway from Brussels to Louvain have been contracted for by M. Detiège, and are to be commenced forthwith. The project will be completed in two years hence.

The college of the burgomaster and councillors of the town of Brussels have issued printed instructions to prevent accidents that may arise from the use of mineral oils for the purposes of illumination.

The show of cattle, generally held at Brussels the Monday before Easter, will take place on the 20th March, at the Abattoir.

SOCIETY OF ENGINEERS, EXETER HALL.—The paper to be read on Monday, March 2nd, is "On the Relation between the Safe Load and the Ultimate Strength of Iron," by Mr. Zerah Colburn.

STATISTICS OF COMPETITIONS.

THE accompanying table of statistics has been prepared in order to test, as far as possible, the effect of the present system of competition upon the members of the architectural profession.

The years 1859 and 1860 are omitted, in consequence of imperfect information.

It cannot be denied that competitions now and then assist some few unusually fortunate men; but it is evident that every one of these acts prejudiciously to the interests of other members of the profession, since the outlay incurred by unsuccessful competitors is enormous; and their drawings, when returned, are worth little more than waste paper.

An individual chance in a competition is this:—

It is 20 to 1	against winning	first premium, 51*l.*	av. value.
10 to 1	,,	second do 20*l.*	,,
20 to 1	,,	commission 323*l.*	,,

To enter the lists, therefore, with a fair chance of success, we must be prepared to send in for twenty competitions: these will cost in cash 300*l.*, a sum nearly equal to the greatest amount we can calculate on obtaining in return. This is, indeed, a favourable view of the case, for in more than half the instances before us no hope was held out that the successful architect would superintend the work, so that perhaps 30 to 1 against obtaining the commission would be nearer the mark.

At present the members of the profession spend nearly the amount of the commission on every competition, so that the public gain the full amount of our services for nothing; and as a rule (although some few gain), the competitors sustain serious losses.

AUGUSTUS FREERE, Architect.

Tabular View of the Values of certain Competitions, in the Years 1857, 1858, 1861, 1862.

	1857.		1858.		1861.		1862.	
Total number advertised in the *Builder*	..	40	..	36	..	49	..	41
Number with premiums known (1)	..	33	..	31	..	30	..	28
,, premiums and outlay known (2)	..	13	..	20	..	12	..	10
,, no premiums offered	3	..	5	..	3	..	0	..
,, first premiums under 20*l.*	11	..	15	..	8	..	13	..
,, ,, over 20*l.* under 50*l.*	9	..	8	..	14	..	5	..
,, ,, ,, 50*l.* ,, 75*l.*	4	..	2	..	2	..	0	..
,, ,, above 75*l.*	6	..	1	..	3	..	10	..
	33	..	31	..	30	..	28	..
Total number of premiums	..	56	..	59	..	57	..	49
Number offering to employ the successful architect	..	5	..	1	..	2	..	2
,, may perhaps ,, ,,	..	13	..	7	..	13	..	7
(1) Total amount of premiums	£1,818	0	£1,699		£2,731		£3,793	
(2) Premiums on those of known outlay	461	0	1,343		1,469		2,215	
Amount of outlay	29,425	0	80,253		40,900		140,300	
Average value of first premiums	50	0	38		53		63	
,, ,, a premium taken on total number	32	10	28		48		75	
,, ,, commission, 323*l.*	..		..		..		..	

Analysis of the Four Years taken together.

Total number having premiums and outlay known		45
Total outlay		£291,388
Total premiums offered	£5,479	
To merge if employed	(deduct) 2,036	
	Premiums..	£3,443
Total commission due		14 565
Gross receipts		£18,008
Outlay on forty-five competitions, allowing twenty competitors in each, at a cost of 15*l.* each	£13,500	
Grand profit to the profession on forty-five competitions, representing an outlay of 291,388*l.*	5,508	
	£18,008	

An average receipt of £122, instead of average value of commission, £323 each.

BUILDERS' BENEVOLENT INSTITUTION.

WE saw with very great pleasure that the recent ball in aid of the Builders' Benevolent Institution was well attended, the rooms being more crowded than on previous occasions. Between five and six hundred assembled together, not only to enjoy a pleasant evening, but to increase the funds of one of our most deserving charities. The Right Hon. the Lord Mayor and the Lady Mayoress, with the Sheriffs, as also Mr. Henry Lee, the president of the Institution, and many of the leading builders of the metropolis, were present on this occasion, with the junior branches of their families.

The hon. secretary and the stewards deserve great credit for the arrangements made by them for the comfort of the assembled guests. The dancing was kept up to a late hour, and everything went off satisfactorily. We hope the funds will receive a large increase, so as to enable the directors to add to their number of pensioners in May next.

THE ARCHITECTURAL ASSOCIATION.

THE usual meeting of members was held on Friday evening (the 20th inst.), at the House, in Conduit-street; the president, Mr. Blashill, in the chair.

A letter was read from the secretary of the Nottinghamshire Architectural Association (Mr. Frederick Jackson), inclosing a copy of the following resolution, agreed to by that body:—

"That the Association, while fully appreciating the exertions of the Institute in the preparation of the valuable scheme of examination for the architectural profession, now submitted for their consideration, deems it due to the large body of architects of experience already in practice, and who cannot be expected to devote the time necessary to an examination, that they should receive from the Institute such a distinct recognition of proficiency, by diploma or otherwise, as will place them in a position not inferior to that of the younger practitioners, who may present themselves for the honours of the Institute."

The following gentlemen were on ballot elected members of the Association:—Mr. C. A. Long, 98, Bishopsgate-street; Mr. W. Roberts, 25, Parliament-street; Mr. H. M. Dunphy, 3, Dr. Johnson's-buildings, Temple; and Mr. Gassling, 4, Upper Gower-street.

Mr. E. L. Paraire moved a resolution to the effect—

"That the members of the Architectural Association suggest that copies of the report upon professional practice and architects' charges, bearing some distinct mark of the Royal Institute of British Architects, should be given to all applicants applying for the same."

He observed that the motion which he had ventured to propose was one in which he was sure they would all concur. He then called attention to the position held by the members of the Architectural Association, who, as students, were not supposed to know with any certainty what were the different matters an architect could legitimately undertake, nor were they competent to form any idea of the charges to be made. But here was the result arrived at by the senior members of the profession, offered them as their guide. Here they would find what they had to learn to enable them to practise, and they would also see what were the charges usual and recognized for such work. He was of opinion—now that the examination was no longer an idea, but an accomplished fact, and that candidates had passed through the ordeal, and had been found sufficiently well informed,—that these gentlemen, having gone so far, were, to an extent, entitled to ask for some guide, some tangible and acknowledged standard, towards which to direct their efforts; and that the document he then held was the very thing they needed. Mr. Paraire then called attention to the established architects, who, from pressure of business and

from other causes, had not time to prepare for or pass the examination. He alluded to legitimate architects; and he thought that they should have their practice clearly defined; and he asked who were the persons to accomplish this desideratum, unless it were the elder members of the profession, who not only could claim experience, but who, incorporated as a chartered body acknowledged and recognized by the public, had, after considerable trouble, framed the rules to which he was now calling their attention. He contended that the document issued by the Institute should be legalized by that corporation by affixing their common seal, or by the signature of the president, or by some other distinguishing mark, and be given to all legitimate architects applying for the same.

The motion was seconded by Mr. North.

Mr. T. R. Smith said he could not quite agree in all Mr. Paraire had said. He thought that it would be a matter of great difficulty to know who were the qualified persons to whom such a document should be given. Moreover, in case of dispute, the document issued by the Institute would not be received as evidence in a court of justice.

Mr. Harris said he thought the Association were exceeding their position in offering any opinion, and he should vote against the motion.

Mr. R. P. Spiers objected to the resolution as unnecessary. It seemed to him that, as it would do neither good nor harm, it would be a wise course not to pass it.

Mr. Fowler said that the question of who was entitled to be called an architect might be very easily solved. If a practitioner were a member of the Institute, or of the Architectural Association, he could no doubt support his charges, if necessary, in a court of law. He thought the Association was indebted to Mr. Paraire for having brought the subject under notice, and he quite agreed with that gentleman that it would be desirable that the seal of the Institute or the signature of its president should be attached to the rules and regulations issued and approved by the Institute.

The President said he doubted whether the rules and regulations could be received in evidence in a court of law.

Mr. T. R. Smith said it would be necessary to call a witness.

Mr. H. A. Reeves was of opinion that the Institute would not be indisposed to consider any suggestion that the Association might offer with reference to giving more direct official recognition to the rules and regulations; and reminded the meeting that in the case of architectural examinations, the Institute had ultimately adopted the views of the Association

Mr. Paraire, in reply, observed that the question for consideration was, not the difficulties that might arise, but the principle involved. If the principle was good, there could be no harm in saying so, and telling their seniors what were their opinions; but if every individual opinion was to be canvassed and discussed before agreeing on the principle, they would never arrive at a conclusion. The whole matter was simple, and resolved itself into the advisability of having some standard towards which they, as students, should steer their course.

A division was then taken, when the President declared the resolution to be negatived by a majority of one.

The President then brought under notice a subject which, he said, had been discussed by a sub-committee, which had been sitting on the affairs of the Association; namely, the advisability of forming a class with reference to architectural examination.

Mr. Spiers approved of the suggestion, and observed that the statement made in the *Builder*, that five of the gentlemen who had passed the recent examination, were members of the Association, was a very gratifying circumstance. He was not clear as to how the proposition could be carried out, as there might be some difficulty in obtaining persons to superintend the classes; but he was persuaded that the suggestion was a good one; and he hoped that the importance of out-of-door sketching in the summer would not be lost sight of.

On the motion of Mr. Harris, the further consideration of the subject was referred to the sub-committee now sitting.

Mr. G. B. New then read a paper "On Ventilation," illustrating his remarks by diagrams and models.

Mr. Battey subsequently explained his principle of natural ventilation in connexion with grates, which he urged provided an efficient and economical mode of ventilation applicable to private dwellings, hospitals, and all kinds of public buildings.

Mr. E. C. Robins also drew attention to Mr. Boyd's inventions and others, which he said were extremely useful, if architects could be prevailed upon to adopt them.

Some discussion ensued, after which a vote of thanks was awarded to Mr. New for his paper.

THE ARCHITECTURAL ASSOCIATION AND THE VOLUNTARY EXAMINATION.

OBSERVING the letter of "H. M." in your number of the 21st inst., which denies the assertion made by "T. R. S." that the Architectural Association has materially aided those of its members who have recently passed the voluntary examination; we, who are of that number, cannot refrain from bearing our testimony to the advantages we have derived both from the Class of Design and the ordinary meetings of the Association; and we feel it the more necessary to do so as the general tenor of the letter seems to suggest a desire on the part of the writer to depreciate the Association, which we cannot believe he entertains.

The argument used is of the weakest description; for while it is incidentally allowed that drawing and design are encouraged (to which, by the way, a quarter of the whole number of marks and one-third of the time are devoted), an endeavour is made to show that the Association teaches nothing by pointing out those subjects which are more rarely brought before it, though no regular attendant would dare to say that they are never treated of. Questions in construction frequently occupy the Class of Design, and much general information is obtainable from the papers read, which, though necessarily discursive, are eminently calculated to lead to deeper study.

We cannot but feel that the remarks of your correspondent are extremely ill-timed, as he is aware that steps are being taken by the Association to form a class with the view of preparing students for the next and subsequent examinations.

(Signed) R. O. HARRIS, LACY W. RIDGE, R. PHÈNÉ SPIERS, HENRY STONE.

CHURCH-BUILDING NEWS.

Wiggenhall, St. Germain's, Lynn.—Most of our ecclesiastical readers are acquainted with the four Wiggenhall Churches, each possessing interesting architectural remains, more especially the one to which our notice refers. This church, contains some very fine fifteenth-century bench-ends and seats. The whole fabric, which is a large one, having been allowed to fall into a very bad state of repair, is at last to be thoroughly repaired, and energetic means are now being used to collect the necessary funds for its restoration. The works had been placed in the hands of Mr. Withers, architect, who has prepared a report, accompanied by a set of drawings for a complete restoration. 2,500*l.* will be required to be expended, exclusive of all decorative art whatever.

Northill (*Beds*).—The restoration of the church of St. Mary, Northill, has just been completed. Exteriorly, the accumulated soil has been removed from the walls, drains made, the footpaths sunk to their proper level, the walls and battlements repaired and pointed, the stone-work of the windows cleaned and, where requisite, renewed, and the east gable crowned with a pierced stone cross. A dwarf spire of wood, covered with lead, has been taken off the tower, the decayed roof replaced by a new one, and the turret in the north-east angle inclosing the spiral staircase carried up some feet above the top of the tower, and finished with a parapet. The porch, with its groined roof, has been *decompoed* and restored, and also the south doorway of the church, which, as well as many other portions, says our authority, the *Bedford Times*, had been so "made up" with cement, that little of the original was left but disjointed fragments. Internally, the whitewash, which covered and disguised the walls, arches, and pillars alike, has been removed, and the arcade of sandstone stands out in its true colour and proportions, no longer obstructed by a ponderous gallery, which formerly cut in two one of the windows of the south aisle. The western arch, since the beginning of the century, had been blocked up by a thick wall, inserted with a view of lending support to the tower, which was in a defective state, and was at the same time braced up with iron stays. This wall has been now removed, and the arch, having been found much broken, reconstructed. The floor of the tower is thus opened to the nave, and the west window, with its tracery, displayed to view. The ringing-floor above has also been renewed. The whole of the nave is furnished with low oak benches, and paved with Staffordshire tiles in three colours. The inner parvise window, before blocked up, has been opened and glazed. The chancel arch it was also found necessary to take down and rebuild. The floor is laid with Minton's encaustic tiles in squares, those within the sanctuary being of richer design and colour, and arranged diamond-wise. The removal of a modern wainscot-screen from the east end disclosed the piscina and triple sedilia, which have been repaired. The east window, executed by John Oliver in 1664, has been cleaned and repaired, the upper compartments (previously glazed with common glass), filled with ecclesiastical emblems and devices by Willement, and the stonework renewed. The other windows of the chancel have been filled with white cathedral glass in a green border. The chancel roof, entirely new, is divided internally into three bays by arched principals of oak cut from the solid tree, connected with the rafters by braces at the ridge and sides, and resting on corbels of sculptured angels bearing scrolls: the spandrils being filled with pierced tracery; the intervals between the purlins are also lined with oak. The rector has been assisted in this undertaking by a loan of 500*l.*, contracted by the parish, with subscriptions from the Harvey family and others; but a considerable proportion of the expense falls upon his own shoulders. The task of restoration was entrusted to Mr. Woodyer, of Guildford, whose designs and directions have been carried out by Mr. Conquest, of Kempston.

Halsted (*Essex*). — Bulmer Church, Halsted, has been restored and re-opened. Before the restoration the church was blocked up with high pews, a west gallery, and the chancel partly occupied by a large family pew, belonging to the Oakems estate. The pews (except the last-named one, which has been lowered), have all been removed, and open benches substituted: the gallery has also been removed, the tower opened, and the font placed there. The aisles and chancel have been paved with red and buff tiles, and the sacrarium or communion with rich encaustic tiles. The works are not yet completed, as sufficient money has not been subscribed, but decoration will be added when the funds are forthcoming.

South Collingham (*Notts*). — St. John the Baptist's Church, South Collingham, has been restored and re-opened. Both the chancel and the body of the church have been restored. In the chancel a new roof of polished pine has replaced the old one. All the stonework has been repaired and restored, and the windows re-glazed. A new floor of encaustic tiles has replaced one of stones and plaster—both in the chancel and nave. A recess, arched, has been built on the north side of the chancel for the organ. The organ has been enlarged and improved. All the old high pews have been removed both from the chancel and nave, and open benches substituted. The arches have been relieved of an accumulation of whitewash, and restored. The unsightly stove which used to obstruct the centre aisle has been removed, and the church is now heated by hot-air flues. The chief improvement is the removal of the gallery, which disfigured the west end of the building, and which, moreover, hid the arch at the entrance to the tower, and also the west window. Another improvement is the provision for exterior access to the ringing chamber. Mr. Hakewill was the architect employed. The tender of Mr. C. Fox, of Lincoln, was accepted; but in consequence of his being declared a bankrupt, the Building Committee took upon themselves the task of completing the work.

Southampton.—At a recent vestry meeting in St. Lawrence's Church, Mr. Beecheno, churchwarden, said he had received a letter from Mr. Frith, who offered to undertake the necessary work of repairing the top of the spire, regilding the vane, &c., for 30*l.*, including any extras that might be required. In a subsequent communication, he offered to execute the work described by Mr. Beecheno for 25*l.*, extras not included. It was agreed that the churchwardens be requested to collect the required amount in voluntary subscriptions, and to employ Mr. Frith to do the work on the last-mentioned terms.

Stone (*Staffordshire*). — The Roman Catholic church at Stone has been enlarged and re-opened. The church was commenced ten years ago, at which time the present nave and aisles were built. The additions were consecrated by Dr. Ullathorne, Roman Catholic Bishop of Birmingham. The external walls and buttresses are of Hollington stone, faced inside with stone of a much finer texture. The style of the church, which will accommodate about 700 people, is the second period of Pointed Gothic. It is divided into nave, side aisles, transepts, and chancel, with a nuns' choir to the north of the chancel, and a semi-circular apse containing the Lady altar to the south. In the north transept is a tribune for the *pensionnaires* of the school, and in the aisles are two small chapels enclosed in light open wood-work screens. That in the north aisle contains "the altar of the rosary," and that in the south, "the altar of St. Winifred and the martyr saints of Stone." A flight of seven steps leads from the nave to the

transepts, and the chancel is elevated three steps above the latter portion of the church. Of the whole number of windows ten are of stained glass. The principal of these are a rose window at the west end of the nave, and a five-light window with tracery at the back of the high altar, the latter the gift of Mr. John Fitzherbert, of Swynnerton. The roof is open, with stained panels, and gas is supplied to all parts of the building. The capitals of the columns from which the arches supporting the clerestory spring are finely carved, but it is in the chancel that the richest work is to be found. The high altar, in common with all the choicer parts of the building, is mainly composed of Caen stone, with columns and slab of polished marble. The frontal contains three pieces of carving—"The Sacrifice of Melchisedec," "The Sacrifice of Isaac," and "Elias fed in the Wilderness." The tabernacle is in polished alabaster marble, and the walls on either side of the altar are inlaid with diapered marble panels. At the back of the altar is a reredos, containing subjects from the life of St. Dominic, in high relief. On either side of the screen and in the centre are niches surmounted by canopies and pinnacles, of which the centre one is 25 feet high. The niche to the right of the altar is occupied by a life-size figure of Mary Magdalene, and that to the left by a corresponding figure of St. Catherine. The niches have pedestals, and the canopies columns of polished marble. In a recess in the nuns' choir, Messrs. Bevington & Son, of London, have erected an organ. The church was built by Messrs. J. & E. Bird, of Hammersmith, from the designs of Mr. Gilbert R. Blount, of London. The carving was executed by Mr. William Farmer, of London. The stained glass for the windows was supplied by Messrs. Hardiman, of Birmingham.

CONSECRATION OF ST. ALBAN'S, HOLBORN.

THE Bishop of London has consecrated this new church, which has been built and furnished at a cost of about 25,000*l.*, besides endowment, by Mr. John Gellibrand Hubbard, M.P. for Buckingham, and a director of the Bank of England. The building stands in a poor district, and is bounded on the east by Leather-lane, on the west by Gray's Inn-lane, on the north by Baldwin's-gardens, and on the south by Brook-street.

Lord Leigh gave a site at the end of Brook-street, and upon that the church stands, the parsonage being built on ground bought by Mr. Hubbard himself. Mr. Butterfield was the architect, and Messrs. Myers & Co. were the builders.

The whole buildings, outside and inside, are in the main of London ordinary bricks, relieved by stone, red and grey; the piers, arches, and windows of the church being of stone. There are a nave and aisles, chancel and aisles, and a porch at the west end, of unusually large dimensions, into which the principal doorways open. Over the chief door (in Baldwin's-gardens) is an inscription to the effect that the church is wholly free and unappropriated. The font, at the west end, is of Derbyshire marble, inlaid with white marble, and the shafts are of Languedoc marble on a black base of Irish marble. The nave and aisles open from the font. The nave is 70 feet long and 32 feet wide, and measures 30 feet to the ridge. The aisles are 9 feet wide, and ornamented with an arcade on red clay shafts. The walls of chancel are of alabaster, inlaid with coloured marbles. Amongst the main features of the church are the frescoes executed by Mr. F. Preedy, from designs by the late Mr. Henry Styleman L'Estrange, of Hunstanton Hall, Norfolk. He designed ten frescoes for the east end. They illustrate the suffrages in the Litany—"By the mystery of Thy holy incarnation; by Thy holy nativity and circumcision; by Thy baptism, fasting, and temptation; by Thine agony and bloody sweat; by Thy precious death and burial; by Thy glorious resurrection and ascension; and by the coming of the Holy Ghost." They are painted in party colours by the water-glass process, like Mr. Maclise's picture at the Houses of Parliament. The reredos is of four arcades, surmounted with evangelistic emblems. The organ, by Mr. Holditch, is in the south choral aisle. The seats, to accommodate 800 persons, are of oak, as is also the pulpit, the base of which is stone, with red clay shafts.

A bell-frame for six bells has been erected by Messrs. Warner & Sons, and a bell, eventually to form the tenor, has been cast and hung by them, note E, about 18 cwt. 3 q. 20 lb.

There is a brass lectern and faldstool. A drinking fountain is attached to the railings of the church, in Baldwin's-gardens, and is supplied gratis by the Water Company.

A fine view of the interior of the church will be found in our last year's volume, p. 443.

SUBMARINE TELEGRAPHY.

THE ATLANTIC CABLE.

A PAPER on the subject of submarine telegraphy with especial reference to the Atlantic cable was read by Mr. Thomas Webster, F.R.S., at the Society of Arts, Adelphi, on the 11th instant. The paper gave rise to an interesting discussion. It went into the question of route for the Atlantic cable, as well as that of its construction. The merits of the Arctic route were rather more favourably regarded than we think they should be, particularly as regards coast damage by icebergs, and the difficulties generally of the Arctic winter. Mr. Webster rightly considered a light cable preferable to a heavy one, such as the last; but admittedly the best mode of constructing such cables is not yet a settled point. At the close of his paper Mr. Webster remarked that—

"On the best construction of the cable, whether a combination of insulated copper wire laid centrically and spirally, protected by the iron wires laid straight, or nearly so, with hemp, asphalte, and similar materials, or other of the various combinations suggested; also, on the best system of insulation or insulators, whether gutta percha, or india rubber, or compounds thereof, or other substances now in existence, and already, or hereafter, to be applied, an inquiry conducted by competent persons may lead to the most important results.

In conclusion, I would suggest whether this society may not be able to promote and facilitate such an inquiry, and materially to contribute to the solution of the question of the best system of telegraphic communication with the great American continent."

The most general opinion as to the question of a light or heavy cable, elicited during the discussion which followed, seems to have been also in favour of a light cable. Mr. F. Jenkin very much defended the present unsatisfactory state of things, heavy cables inclusive, with spiral iron coverings and straight core. He ended, however, by remarking that he had no doubt that before long the problem of a permanent cable in deep water would be solved.

The meeting was also addressed by Mr. Thomas Allen and by Mr. Walter Hancock, who made some remarks on the limited supply of gutta percha and india-rubber, the importance of which were hardly appreciated as they ought to be; also by Dr. Collyer, Mr. C. F. Varley, Mr. C. W. Siemens, and others; but the most satisfactory remarks were made by the Right Hon. J. Stuart Wortley, the chairman of the Atlantic Telegraph Company, who stated that it was a mistake to suppose that the company had *settled* anything as to the construction of the cable, or were bound to any particular firm or form whatever: all they could be said to have settled as to the cable was that in the main the route would be the same as before, with certain exceptions as to its disposal on the coasts.

Rear-Admiral Sir Edward Belcher suggested the appointment, by the council of the Society of Arts, of a committee for the purpose of investigating the whole subject; a suggestion which the chairman, Mr. W. Hawes, the vice-president, said would be laid before the council.

In summing up at the close of the discussion, the chairman said the question now arose as to what was the proper quantity of insulating material to use, and what was the best material for that purpose; and when they had settled that question they had to decide which was the cheapest and best mode of laying down the cable. These were difficulties which no one could doubt the energy and enterprise of this country would overcome; because, in the words of their late Royal President, if a body of Englishmen said they would succeed, their energy and indomitable courage never failed in accomplishing success.

GAS.

THE Yarmouth gas consumers are urging a reduction of the price of gas from 5s. to 4s. 6d. and 4s., according to quality consumed; and threaten a strenuous opposition to a Bill which is being applied for by the company, unless these terms are agreed to.

The Ipswich Gaslight Company's directors recommend a dividend of 10 per cent., and a balance of 985*l.* to be carried to their reserved fund, at same time reducing the price of their gas.

The report of the Bury Gas Company's directors also recommends a dividend of 10 per cent. on old capital, and 7½ on the new, besides paying what is called arrears of dividends on years when the per centage was less, and also laying "a solid foundation for the reserve fund" of 3,000*l.* which the law allowed them to make. The report was adopted, and the price of gas reduced from 6s. 8d. to 6s. 3d.

The Tunbridge Company have declared a dividend of 7½ per cent., and the Tunbridge Wells Company have reduced their price from 5s. 10d. to 5s. 5d.

The Stafford Company have declared a dividend of 7 per cent., free of income-tax.

Endeavours are being made at Bristol to have the price of gas reduced to the Plymouth price of 3s., or even lower; and a gas consumers' company is being threatened by the Gas Consumers' Association.

The Malvern Link gasworks are reported to have cost 5,281*l.*, pipes, &c., inclusive; and the company have already declared a dividend of 5 per cent. per annum for the second half-year of their existence.

The Cardiff Gaslight and Coke Company have resolved to reduce the price of their gas from 4s. 3d. to 4s., in the hope of an increased consumption.

The Newport Gas Company's directors report a depression in consequence partly of the reduction made in the price of their gas, which, however, has not prevented them from dividing the usual 10 per cent. on class A shares, and 3¾ths per cent. on class B shares; nor from announcing even a further reduction in price, of 5 per cent.

The Liverpool Company have agreed to a dividend of 5 per cent. for the half-year, being the first since the last reduction of price; which, however, only shows the elasticity of gas dividends under the pressure of reduced prices.

RAILWAY MATTERS AND TOWN DISFIGUREMENT.

THE numerous railways and bridges projected for the metropolis are exciting anxiety in the minds of those interested in the architectural aspect of the metropolis.

Mr. Tite asked the First Commissioner of Works in the Commons last week, whether the Government intended to institute any inquiry into these various projects, or to subject to any control the architectural character and construction of bridges crossing the Thames or the streets and roads which were interfered with?

In reply, Mr. Cowper admitted that some of the great undertakings which had done so much for the convenience of the metropolis had done so at the expense of a very great disfigurement of some of their principal thoroughfares. With reference to the first part of the question, he could only refer to the report of the Board of Trade, which enumerated twenty-nine railway undertakings affecting the metropolis and its suburbs. With regard to the latter part of the question, the subject could not be in better hands than in those of the President of the Institute of British Architects. He thought it likely that members representing the metropolis would be prepared with some proposal on the subject.

Mr. Lewis recurred to the same subject next day in a question put to the President of the Board of Trade, as to what protection to the public was afforded by that Board.

Mr. Massey, for the President, replied that he did not propose any special mode of dealing with this particular class of railways. The metropolitan schemes would be submitted to the general committee of railways, and by them be classified; and after they had undergone the process of investigation to which such schemes were subjected, he thought it very likely that many of them would disappear. He certainly agreed with the hon. member for Bath (Mr. Tite) that it was desirable in a case of this peculiarity that the public interest should be protected by giving powers to some body representing the public interest to appear before those committees, and to watch their proceedings; and named the Metropolitan Board of Works as the proper body; and promised to prepare a revision of the standing orders to enable that Board to look after all such schemes. Sir George Grey said the Government need not have any special control over such undertakings.

Lord Derby has also since brought the subject before the House of Lords.

At the London Court of Common Council last week, it was stated that the 20,000 shares which were taken by the corporation for the promotion of the Underground Railway had yielded a profit of 32,000*l.* on the sale already effected of 18,000 of them; and as the purpose in view of promoting

the formation of the line had been effected, it was resolved forthwith to dispose of the remainder of the shares.

The Bill before Parliament for the extension of the Great Eastern Railway to Finsbury-circus is exciting considerable interest. The measure is meeting with strong opposition from the inhabitants of the neighbourhood of the proposed terminus; and it has been rightly remarked that although open spaces such as Finsbury-circus are no doubt tempting to the cupidity of railway companies for the saving of their funds, that is no reason why the public or the Legislature should submit to have the few open spaces in the metropolis filled up with brick and mortar simply to save such companies the cost of obtaining sites for their stations.

The abominable eyesores in the shape of girder bridges lately put up in Southwark and elsewhere (discreditable to all concerned), and the threat of what is to be erected across Ludgate-hill, ought to have immediate attention.

Speaking of a proposed Metropolitan Railway for Dublin, the *Evening Post* for that city says:—"This project is causing great dissatisfaction in this city. Petitions against the Bill are in course of signature; and a requisition is also in preparation, requesting the Lord Mayor to convene a meeting of the citizens to avert what it is considered would be a deformity and serious injury to this metropolis."

MONUMENTAL.

Wedgwood Statue, Stoke-upon-Trent.—We are empowered to contradict the statement of a correspondent quoted by us from the *Staffordshire Advertiser*, describing the pedestal of the statue as ordinary red sandstone, although it has the appearance of red sandstone at a distance. It is, in fact, of the compact gritstone, from Mansfield.

Jacob Memorial.—A design for a monument to the late Major Jacob, for Salisbury Cathedral, has been furnished by Mr. Street, architect. It will consist of a series of arches, supporting a slab and inclosing a tomb. These arches will be supported by short columns of Purbeck marble, resting on a base of yellow Mansfield stone, supported by a pedestal of gray Forest of Dean stone. Beneath the slab and inclosed by these arches will be a coped tomb of Caen stone, resting on a base of red Mansfield. The arches will be of alabaster, and between them mosaics will be worked. The slab at the top will be of Purbeck marble, and will contain a brass foliated Gothic cross, with Mediæval sword and spurs, to indicate the rank of the major in the volunteer service. The caps of the columns will be carved with Gothic foliage. The whole monument will stand on a platform composed of white marble, with a pavement of inlaid mosaic, red marble, and various coloured stones. The dean and chapter have approved of the design.

MILITARY AND MONASTIC ARCHITECTURE.

A LECTURE, profusely illustrated, was delivered at the Church of England Institute, Newcastle, by Mr. F. R. Wilson, architect, Alnwick, on the Military and Monastic Life of the Middle Ages in Northumberland, on Monday, the 23rd inst. He suggested that the remains of our Mediæval architecture are more indicative of the manners and customs of our forefathers than any other relic we possess of them; and that they should be preserved with the most dutiful reverence. It is not the life of kings and nobles, of abbots and monks, that should be seen reflected in the ruins of our castles and abbeys, more than those of the masons, joiners, plumbers, smiths, and artist-workmen who wrought the stones, carved the timbers, rolled the lead, welded the iron, and moulded the decorations of these structures; and these grades and trades are equally interested in the conservation of our national antiquities. One of the illustrations consisted of a large map of the country, dotted with red crosses and circles. These marks showed the sites of the numerous Northumbrian castles and peel towers, and of the most celebrated border battlefields. Black crosses and circles on the same map showed the sites of churches and monastic buildings. A large drawing of "Alnwick Castle besieged" represented the mode of Mediæval warfare; and numerous photographs conveyed to the audience a sense of the beauty of many neglected ruins. Mr. Wilson also exhibited a portion of his Lindisfarne survey,—a measured and drawn-to-scale delineation of the churches between the Tyne and the Tweed.

THE ARCHITECTURAL MUSEUM.

OUR readers may be glad to hear of some movement here. We learn from the honorary secretary that cards for a course of lectures will shortly be issued. The session will be opened with an address from the President, Mr. Beresford Hope, and will include the following lectures:—"On Mediæval Studies in Palestine," by Mr. J. G. Wigley; "On the Ely Lantern," by the Dean of Ely; "On Construction and Ornament, old and new," by Sir Henry Dryden, Bart.; "On Architectural Mosaics," by Dr. Salviati; "On the Art Collections at South Kensington, considered in reference to Architecture," by Mr. J. C. Robinson; "On Architecture, its Purpose and its Place among the Arts," by Mr. T. Gambier Parry.

The prizes of 1863 will consist of two (20*l.* and 5*l.*) for a carved miserere, and two for coloured decoration (5*l.* 5s. and 3*l.* 3s.), the latter being offered, as usual, by the Ecclesiological Society and Mr. Beresford Hope. Full particulars of the competition will, of course, be made known without delay.

PREMIUMS FOR WOOD CARVING.

IN consequence of a communication from the Society of Wood Carvers, the Society of Arts have arranged to hold an exhibition of wood carving, both modern and ancient, in the month of June next. The council have further agreed to offer the Society's silver medal and to make a grant of 30*l.*, the Society of Wood Carvers giving 15*l.*, as a fund for prizes to be awarded to the most meritorious exhibitors.*

Mr. S. C. Hall has liberally added three guineas, as an extra prize.

The first prize in the first division, human figure in alto or bas relief (animal or natural foliage may be used as accessories) will be 8*l.* and the Society's silver medal.

Employers or private owners may be exhibitors, but *bonâ fide* workmen only can receive prizes.

The judges will be selected, four by the council of the Society of Arts, and three by the Society of Wood Carvers.

COMPETITIONS.

Leicester.—Sir: I have enclosed you a circular received by us, soliciting a "sketch for a monument" for the late Mr. J. F. Hollings. I have also enclosed you our reply to the same, which we have sent to the various local newspapers. If you will kindly insert this we shall feel obliged. H. G.

THE HOLLINGS MEMORIAL.

SIR,—As the memorial to the late Mr. Hollings is a subject of considerable interest to the town, will you oblige us by inserting a word or two as to the proposed competition for its design?

The sub committee of the Memorial Fund have issued a circular "to the Architects and *Designers* of Leicester and the neighbourhood," invoking them to send in sketches for a "monument;" but as the word "designer" is so unlimited in its application, and in the sub-committee's reading of it includes persons who have actually applied to architects of the town *to make designs for them*, the architects beg to decline the honour of the competition, at the same time wishing the committee every success in their labours, from the respect we each entertain for the memory of the late J. F. Hollings, Esq.—We are, Sir, yours obediently,

DAIN & SMITH,
GODDARD & SON,
SHENTON & BAKER,
WILLIAM MILLICAN,
W. JACKSON,
R. J. GOODACRE,
JAMES BIRD,
JAS. FRANK SMITH.

STAINED GLASS IN ST. PAUL'S CATHEDRAL.

YOUR correspondent "G. R." has written to ask me certain questions, and has requested an answer in your columns.

1. "Would the authorities of St. Paul's permit a painted memorial window to be put up over the altar, the lower central window of the six?"

2. "What would be the probable expense, to be done by the best artists? The design to be submitted to and approved by the authorities of the Cathedral."

The Dean and Chapter desire to see the six windows of the apse filled with stained glass, and have conceded the window spoken of by your correspondent to the Drapers' Company. They have further put the design in the hands of Professor Schnorr, in concert with the Cathedral surveyor; and the glass is to be executed at Munich, at the Royal Stained Glassworks. The cost will not, it is believed, exceed 600*l.* Professor Schnorr has also been desired to prepare, at the same time, on a smaller scale, designs for the other five windows of the apse, to be executed as opportunity shall offer, also at the Munich works.

Should your correspondent think proper to avail himself of these conditions, the Dean and Chapter would be very glad to concede one of the upper or lower windows; except, of course, that which has been given to the Drapers' Company. The subjects are, 1, "The Agony in the Garden;" 2, "The Crucifixion:" this is the window to be given by the Drapers; 3, "The Burial;" 4, "The Resurrection;" 5, "The Ascension;" 6, "The Day of Pentecost."

I may also mention, that all other windows which occur in the end walls of the nave or transepts are designated for stained glass, and the great west window is already given by Mr. Thomas Brown. The subject, "The Conversion of St. Paul." The design, likewise, is being prepared by Professor Schnorr, and the glass is to be executed at Munich.

A short inscription, of a memorial character, might form part of the window.

F. C. PENROSE.

* The Society of Wood Carvers (Newman-street, Oxford-street) have also offered, as we are reminded by Mr. Lock, the honorary secretary, the sum of 15*l.*, in three sums, for the best work sent in to the Exhibition of the Society of British Sculptors, which opens in April next.

PREPARATION FOR THE ARCHITECTURAL EXAMINATIONS.

THE result of the recent examinations at the Institute having been made known, together with the report of the examiners, will you permit me to make a few suggestions which, I think, will tend to give greater success to this new experiment? And, first, let me remark that, considering the very elementary character of the examination in the class of Proficiency, a larger number than eight out of nineteen candidates might have been expected to have passed. In "pass" examinations at the Universities, *one-third* or *one-fourth* of the candidates is considered a large number to be "plucked," but here we have more than *one-half* placed in that unenviable position. Having myself had much experience in the preparation for examinations, I know the difficulty experienced by persons in studying for them from books alone, without aid from a competent instructor. It is the same as if a man were to attempt to drill himself for the army without a drill-sergeant to direct him. I would, therefore, suggest that either the Institute or the Association should form evening classes for the study of the particular subjects required in these examinations; each class to be presided over by some one who has given his attention more especially to that particular branch. This would give students of architecture the means of acquiring branches of knowledge which they have now but little opportunity of learning. For although there are classes for these subjects at the colleges in London, yet it is necessary, in order to avail oneself of them, to enter as a regular student, and thus trench upon the office work of the day, which but few are in a position to do.

I believe such classes, if under able direction, would answer well, and would be self-supporting; the fees (after deducting expenses), to go to the teacher of each class. E. W. TARN, M.A.

EXPLOSIVE BUSINESSES: NOXIOUS BUSINESSES.

PERHAPS it may not be known to many persons carrying on the above-mentioned businesses within the metropolitan district that (in pursuance of the unrepealed sections of the Metropolitan Building Act, 1844), after August, 1864, no manufacture of gunpowder, detonating powder, matches ignitable by friction or *otherwise*, or other substances liable to sudden explosion, inflammation, or ignition; or of vitriol, turpentine, naphtha, varnish, fireworks, or *painted table-covers;* nor any other manufacture dangerous on account of the liability of the materials or substances employed therein to cause sudden fire or explosion, will be allowed to be carried on, either in buildings or vaults, or in the open air, within 50 feet from any other building, or any other vacant ground belonging to any other person than the landlord of the manufacturer, or within 40 feet from a public way, *whether it is an old-established business or not.*

Persons carrying on noxious and offensive businesses nearer than 50 feet to a dwelling-house, or 40 feet to a public way, if old-established businesses, are left till August, 1874.

Gas-works seem to be included in the restriction to August, 1864, except in respect of works authorized by Acts passed before 1844, within the districts then lighted by them.

It would be well for persons carrying on any of the above businesses to read the sections 54 to 63 of 7 & 8 Vict., c. 84, carefully.

R. HESKETH.

ARCHITECTURAL SOCIETIES AND THE PRESS.

SIR,—I am sorry to see that the same illiberal, narrow-minded spirit which has been displayed at the Institute with regard to publishing the papers read there is spreading to the Association, having been introduced by a member of the Institute. Now, sir, I maintain that this is a movement tending greatly to the injury of the younger members, and ought, if possible, to be nipped in the bud, being wrong on the face of it. My own case will illustrate this. On the evening when the lecture referred to was read, I was engaged on business, and so looked forward to your report of the same, which, of course, was not forthcoming. There is another reason why the papers should be published, and that is the importance of educating the public in art matters; which these same gentlemen uphold, saying that it will further the interests of art and architects if the public taste be improved (and there is a large field for it), and yet they countenance a movement diametrically opposite; for I cannot conceive a better plan for attaining this object than by giving publicity to lectures on art in the *Builder*; whereas, if brought out as Transactions, they would be seen by a very limited number, who are perhaps already acquainted with their contents. I trust you will, with your known sense of justice, insert this. ARCHITECT.

A WORD FROM CLERKS OF WORKS.

SIR,—Will Mr. Rickman be good enough to explain his meaning a little more clearly when, in his paper on the position of measuring surveyors, he says,—"I would much rather be brought into contact with an intelligent builder's clerk than with a clerk of the works."

The words in their present form seem to cast a slur upon the abilities and intelligence of clerks of works in general; but, as a clerk of works, I would willingly hope this is not intentional: if so, surely Mr. Rickman's opinion is not generally shared by the profession to which he belongs? S. W.

Books Received.

Bruges et ses Environs. Description of the Monuments, Works of Art, and Antiquities; preceded with an Historical Notice. By W. H. JAS. WEALE. London: Barthé & Lowell, Great Marlborough-street. 1862.

MR. JAS. WEALE, who is known as an accomplished writer on art and archæology, has produced an admirable little guide (in French) to a knowledge of the history and antiquities of Bruges, a town interesting alike by its associations and contents. Until quite recently Bruges had preserved more than any other town in Belgium its Mediæval aspect; but this is now rapidly disappearing under the hands of modern Vandals. Mr. Weale denounces strongly the present course of restoration to which the old buildings of Belgium have been or are being subjected. At the Hôtel de Ville of Bruges he describes sad work. He says they have changed the character of all the sculpture; they have placed in niches statues the costumes of which are anachronisms, and which statues are too large for the niches they occupy; and have inserted tracery in the windows without connexion with the construction. There remain now in the façade only some rare morsels of the old work, easily to be recognised. The Guide is adorned with two maps, one of Bruges, the other of its environs.

Miscellanea.

BELL-CASTING, COLCHESTER.—On Monday, the 23rd instant, was cast at the foundry of Mr. Dearn, in Colchester, a small bell for the church of Furtwengen, in the state of Baden; this being the first church bell made in Colchester. The metal was the gift of Messrs. Peter & George Dold, of this town. The bell is decorated with crosses, inscribed in circles, and with suitable inscriptions in Latin, recording the names of the "founders" and benefactors; and will be "consecrated," according to our correspondent, at St. James's Church, next Sunday, the 1st March.

ARCHÆOLOGICAL DISCOVERY AT ROTTINGDEAN.—To improve the cricket-ground on "The Beacon," it became necessary to remove a low hillock or tumulus of a circular form, and about 30 yards in diameter. Near the centre of the tumulus the workmen met with a grave, of oval form, containing the skeletons of four adult persons, lying with their heads towards the north. Near the south side of this grave or vault was a small urn of sun-baked clay, and of sufficient capacity to have contained the remains of an infant. Four other oval graves were found.

SOUTH KENSINGTON MUSEUM.—During the week ending 21st February, 1863, the visitors have numbered 10,337.

THE FATAL ACCIDENT AT COAL DEPÔT, PADDINGTON.—The inquest in this case has terminated in a verdict of "Manslaughter" against John Edwards, the manager to Messrs. Smith & Knight, the contractors, and William Lester, the contractor for the removal of the soil and the sinking of a well; on the ground that they had not taken proper precautions for the prevention of such an accident as that which had occurred.

VENTILATION OF THE CELLS AT WESTMINSTER HOUSE OF CORRECTION.—At a recent general meeting of Middlesex magistrates, the Deputy Clerk of the Peace laid before the court a letter received by him from the Home-office, returning the plans of alterations for ventilating certain cells in the House of Correction at Westminster, as approved by Sir George Grey, Home Secretary. Mr. G. F. Franco then moved—"That the visiting justices at the House of Correction at Westminster be empowered to cause the old cells in the double wings of section A of the prison, containing 148 cells, and comprising about one-third of the total number included in the drawings laid before the court on the county day of the November session, 1862, when the same shall have been approved or modified by the Secretary of State for the Home Department, to be warmed and ventilated at an expense not exceeding 1,500*l*." Mr. Kemshead said he believed that they were going rather too far in their endeavours to make the prisoners comfortable; and the consequence was that the prisoners did not care about the punishment. It was his opinion that they ought, in the first instance, to let them have a taste of imprisonment without the luxury of a fire. After a short discussion, however, the motion was put and agreed to.

THE DANISH KING'S KEEPSAKE TO THE PRINCESS ALEXANDRA. — Dagmar, the "Darling Queen" of Denmark, died in 1212, and was buried in Ringsted church. She was carried to the grave adorned with a costly jewel, which lay on her breast. In the time of Christian V., when her tomb was opened, this cross was taken care of, and is now one of the most precious objects preserved in the Museum of Northern Antiquities. This golden cross, which is about 1½ inch long and 1 inch broad, is covered with figures in enamel on both sides, and is supposed to be of Byzantine workmanship. It is the only enamelled cross which is known to be older than the year 1212. It is always beheld with veneration by the crowds who visit the museum, for it speaks of a lady beautiful beyond compare, who died in the bloom of youth, and who demanded neither goods nor gold, broad acres nor stones of price, as her morning gift, but only asked Valdemar the Victorious, her lord and master, to free the peasantry from their plough-tax, and the poor prisoners from their fetters. We learn from the *Danmark*, that the king has caused an exact copy of this cross to be made by the Court Jeweller, Mr. Diderichsen, as part of a rich diamond necklace given to the Princess Alexandra on her leaving the shores of her country.

TENDERS.

For works proposed to be done at Carpenden, near Watford, Herts, for alterations and addition to the mansion for Mr. R. R. Carrew. Mr. Bartleet, architect. Quantities supplied:—

Wood, Brothers	£7,777 0 0
Downes	7,720 0 0
Mansfield	7,550 0 0
Ryder	7,178 0 0
Conder	6,924 0 0
Piper & Wheeler	6,742 0 0
Chalk	6,490 0 0

For new church, roads, and fences, at North-hill, Highgate. Mr. A. W. Blomfield, architect. Quantities supplied by Mr. J. A. Bunker:—

Child & Son	£2,659 0 0
Broadbent	2,507 0 0
Browne & Robinson	2,496 0 0
Wheeler	2,445 0 0
Turner & Sons	2,399 0 0
Carter	2,390 0 0

For the erection of a public house at Wavertree, Liverpool, for Mr. Joseph Lane. Mr. William Paice, of London, architect:—

Stanley	£3,114 0 0
Bottom & Co.	2,800 0 0
West	2,760 0 0
Foster	2,600 0 0
Laws	2,320 0 0
Hill (accepted)	2,210 0 0

For residence, Buckhurst-hill, Essex. Messrs. John Young & Son, architects:—

	House.		Gardener's Cottage.		Total.
Hart	£1,855	..	£155	..	£2,010
Rivett	1,742	..	133	..	1,875
Patman	1,695	..	135	..	1,830
Salter	1,590	..	130	..	1,720
Chessum	1,390	..	125	..	1,515
Browton	1,265	..	89	..	1,354

For building three cottages in Albert-road, Bancroft-road, Mile-End, for Mr. W. Owen. Mr. W. P. Griffith, architect:—

Ebbage (accepted)	£395 0 0

For a pair of cottages at Plaistow, Essex. Mr. James Tolley, architect:—

Perry & Judson	£620 0 0
Watts	535 0 0
Fisher	514 0 0
Payne (accepted)	505 0 0

For building a public hall at Camden Town, for Mr. Ludbrook. Messrs. Sandall & Selway, architects. Quantities supplied by Mr. Gritten:—

Mundy	£1,780 0 0
Gammon	1,695 0 0
Haward	1,650 0 0
Colls & Co.	1,644 0 0
Patrick	1,618 0 0
Sharpington & Cole	1,587 0 0
Arnold	1,378 0 0

For workhouse, Shoreditch. Mr. Wm. Lee, architect. Quantities by Messrs. Linsdell & Giffard:—

Neill	£65,020 0 0
Scott	57,200 0 0
Pritchard & Son	57,000 0 0
Wood & Sons	53,976 0 0
Scrivener & White	53,947 0 0
Hack & Son	53,944 0 0
Dethick	53,917 0 0
Myers & Sons	53,749 0 0
Sawyer	52,853 0 0
Maeers	51,165 0 0
Stap	50,750 0 0
Palmer	50,000 0 0
Hill, Keddell, & Robinson	48,855 0 0
Loft	47,346 0 0
Hart	46,768 0 0
Perry	46,750 0 0

The last four tenders being selected from the rest were voted for by the guardians, and resulted in favour of Mr. Perry, whose tender was accepted.

The tender of Mr. Maeers has been accepted for building the Fine Arts Gallery, for Mr. E. Lloyd, at Vauxhall Bridge. Mr. Wm. Lee, architect.

The tender of Mr. Jarvis has been accepted for the five houses to be built for Mr. F. Powling, at Haggerstone. Mr. Wm. Lee, architect.

For the erection of one pair of villas, at Baker-street, Enfield. Mr. Thomas Joseph Hill, architect:—

Barker	£1,379 0 0
Cushing	1,375 0 0
Plowman	1,312 10 0
Field & Son	1,130 0 0
James & Ashton	988 0 0
McPherson	950 0 0

For the erection of three pair of semi-detached villas at Enfield. Mr. Thomas Joseph Hill, architect:—

Cushing	£4,115 0 0
Plowman	3,937 10 0
Field & Son	3,353 0 0
James & Ashton	2,888 0 0
McPherson	2,850 0 0

For new parsonage-house and stables, at Fogmore, Herts:—

	House.		Stables.	
Simms	£1,509 0 0	..	£300	0 0
Thompson	1,396 0 0	..	282	0 0
Jackson & Shaw	1,270 0 0	..	227	0 0
Rhodes & Roberts	1,252 0 0	..	215	0 0
Young	1,218 0 0	..	217	0 0
Bottom & Co.	1,218 0 0	..	210	10 0
Wells	1,212 0 0	..	212	0 0
Lathey	1,202 0 0	..	188	0 0

TO CORRESPONDENTS.

Birkenhead (the only suggestion that occurs to us is,—advertise).—E. M. B.—W. P. G.—R R. B.—C. B.—J. W.—W. P. (we print a letter to same effect).—W. & Sons.—G. T. W.—T. R. S. (too late).—W. A.—E. W.—T. W.—S. & C.—G. T. H.—W. F. P. (next week).—J. T. L.—M. P.—G. W. R. (asks the result of the "Tunbridge Wells Competition".)—W. S. (the charge was ridiculously small if the work was properly done).—T. H. (did not reach us in time).—H. G. & Son.—Lex.—R. H.—M. D, W.—J. P.—P. H.—S.—Ten Years' Subscriber (during the freezing).—H. D. (next week).—W. S.—G. L.

We are compelled to decline pointing out books, and giving addresses.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender; not necessarily for publication.

THE *Daily News*, July 1st, speaking of Benson's watches in the Exhibition, says:—"Here are arranged a fine selection of watches manufactured by him on the latest and most approved principles of horological science. When we compare them with the specimens of ancient watch-work which are placed beside them, or even with those worn by our grandfathers, the immense advance in this branch of the mechanical arts is at once apparent." Chronometer, duplex, lever, horizontal, repeaters, centre seconds, keyless, split seconds, and every description of watch, from the plainest to the highest quality of which the art is at present capable, and adapted to all climates. Benson's Illustrated Pamphlet on Watches (free for two stamps) contains a short history of watch-making, with descriptions and prices. It acts as a guide in the purchase of a watch, and enables those who live in Scotland, Ireland, Wales, the Colonies, India, or any part of the world, to select a watch, and have it sent free and safe by post. J. W. BENSON, Prize Medallist, 33 and 34, Ludgate-hill, London. Established 1749.—[Advt.]

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